WORKSHOP

BEFORE THE

CALIFORNIA ENERGY RESOURCES CONSERVATION

AND DEVELOPMENT COMMISSION

In the Matter of:	)	
	)	Docket No.
2008 CALIFORNIA BUILDING ENERGY EFFICIENCY STANDARDS	)	

CALIFORNIA ENERGY COMMISSION

HEARING ROOM A

1516 NINTH STREET

SACRAMENTO, CALIFORNIA

THURSDAY, FEBRUARY 23, 2006

10:10 A.M.

Reported by:
Christopher Loverro
Contract No. 150-04-002

COMMITTEE MEMBERS

Arthur Rosenfeld, Commissioner

ADVISORS, STAFF and CONSULTANTS PRESENT

Elaine Hebert

William Pennington

Mazi Shirakh

Bruce Maeda

Joe Wong
Lawrence Berkeley National Laboratory

Charles Eley
Eley Associates

Jon McHugh
Heschong Mahone Group

Snuller Price
E3

Ron Hofmann
California Institute for Energy and Environment

Dave Watson
Lawrence Berkeley National Laboratory

Carlos Haiad
Southern California Edison Company

ALSO PRESENT

Mike Gabel
California Association of Building Energy Consultants

Bill Mattinson
California Association of Building Energy Consultants

Robert Raymer
California Building Industry Association

ALSO PRESENT

John Hogan
City of Seattle

Hashem Akbari
Lawrence Berkeley National Laboratory

Carli Razivri
County of Los Angeles

Steve Gates
Hirsch and Associates

Gary Farber
Farber Energy Design
California Association of Building Energy Consultants

Ken Nittler
EnerComp

Jim Benya
National Fenestration Rating Council

Marshall Hunt
Pacific Gas and Electric Company

Reed Hitchcock
Asphalt Roofing Manufacturers Association

I N D E X

P R O C E E D I N G S

10:10 a.m.

MS. HEBERT: Good morning, everyone. Welcome to our second day of the February 2008 California building energy efficiency standards workshop. My name is Elaine Hebert; I'm one of the energy efficiency staff here at the Energy Commission. I'd like to introduce a few other Energy Commission Staff and related folks.

Commissioner Art Rosenfeld is up here joining us today. Thanks, Art, for joining us. To my right is the Project Manager for this large, ongoing project, Bill Pennington. Next to him is Mazi Shirakh, the Technical Lead. And next to him is Charles Eley, who's a contractor leading the team of contractors and subcontractors to do a lot of the research and writing for this project.

One change in the schedule for today from the original schedule that was published on the internet is in the afternoon our topic overall envelope approach has been postponed till a later workshop. And we'll just see how the topic before that goes; it may take longer than the hour that we had allotted. And following that will be a time for public input. So the afternoon schedule

is a little bit flexible.

This morning we're going to start with programmable communicating thermostats. And I'm going to introduce Carlos Haiad, who will then introduce the speakers. So, Carlos, welcome.

MR. HAIAD: Good morning, thank you. My name is Carlos Haiad with Southern California Edison. The PCT is known by now, was an effort among various utilities, not just Edison, not just PIER, not just E3 and HMG, but was an effort of a group of people. I'd like to make sure that they are all recognized from Sempra and PG&E.

I'd like to introduce Jon McHugh from HMG; and I also see Snuller Price from E3 in the corner there. Thank you.

MS. HEBERT: Thank you. All right, take it away, Jon McHugh.

MR. McHUGH: Hopefully everyone's here to see the PCTs or programmable communicating thermostats case presentation. The primary concept of this proposal is that during the hottest times of the year this drives our peak; air conditioning load is the highest and that drives peak demand.

And we're trying to find alternatives to

just building more power plants. And one of those alternatives is to have a thermostat that automatically increases its set point like four degrees for a short period of time.

And standards currently have a requirement for programmable thermostats. And PCTs have this additional word communicating. So, the thermostats are programmable. And we're proposing that there's a new programmable feature that allows people to choose to set up their thermostat when the cost of electricity increases above so many cents per kilowatt hour.

Also the main part is communicating and the key concept we're looking at is one-way thermostats that receive a signal from the utility and respond by setting up the thermostat.

Now, unlike prior load programs, air conditioning, load shedding programs, we're not just cycling the air conditioner and the people inside of the building, depending on how over-sized your air conditioner was. They might be just fine in terms of comfort. Or they might get really hot. This uses a thermostat so that, you know, we're talking about a four-degree increase in temperature, not a 20-degree increase.

So the primary capabilities of the thermostat is that it be able to increase the set point by four degrees, and this results in a temporary reduction in air conditioning.

And we're also looking at that these thermostats have some kind of descriptor that indicates their geographical location, so that the utilities can also use these thermostats to ease congestion on their transmission or distribution system, so that we're not just looking at necessarily issues around price, but also issues around reliability of the electrical system.

And that includes not just how much capacity is available in terms of electrons, but also capacity of the transmission and distribution system.

So there's essentially two kinds of load shedding possible with these thermostats. One which is an emergency load shed for reliability issues. And another one which is a voluntary load shed which the consumer is able to decide above a certain price they can reduce their air conditioning consumption and save some money.

What is the thermostat communicating to? Well, there's the other side of the system besides

the thermostat. There's the utility communication infrastructure, so there's someone, you know, at a dispatch facility that is sending the information that I either have a lack of capacity problem, or I'm sending what is the real-time price of electricity at this point in time.

And then there's a communication infrastructure that supports getting the signal from the utility to the PCT. And then finally there's the metering infrastructure that identifies that yes, indeed, someone did shed their air conditioning load at this certain amount of time and we're going to pay that customer some money for reducing their loads during that time.

Now for the --, Snuller Price.

MR. PRICE: Thanks, Jon. Good morning. I'm going to walk us through briefly the methodology that we used, our team used, to develop the economic case for PCTs. This work comes out of work funded by the CEC PIER program to look at the value of demand response, as well as work funded by the building standards program to look at application to the building standards.

Methodology overview. We've got about half an hour and we've got quite a few steps in

the methodology, so my goal is to get everybody a sense of generally how it works. We have a report online that has a lot of detail in terms of each step-by-step-by-step. But hopefully I can give us a roadmap sufficient for people to be able to ask questions when we're done.

There's essentially two components of value that we've applied to the PCTs. The first component of value we're lumping together, calling it resource value. And that's exactly the same time-dependent valuation methodology that we've used and applied for other measures proposed for the building standards.

That includes components that Jon mentioned like the energy benefits, generation capacity, transmission and distribution capacity, environmental benefits. And we discussed the TDV methodology and its updated in the December workshop on lifecycle cost analysis. I don't want to go over a lot of that again, but that's the first component of the valuation.

The second piece that we're looking at as unique to demand response is the additional amount of load reduction that we can get during a system emergency. Instead of rotating blackouts,

a period where we've got generation capacity or transmission capacity bottlenecks, the concepts is to have the ability to get additional load reduction at customer sites so that we can do reset thermostats rather than putting customers or people in the dark. So there's a reliability component. I'm going to look at the value for both of those.

One critical piece of the methodology that's important here is that you have to be careful not to double count. So, we've got the resource value, we've got emergency value, but we're not trying to take 1 kilowatt of load reduction and count it for both, avoiding a power plant requirement and providing reliability. Kind of do one or the other, and our analysis is really trying to take account of the fact that we're not double counting.

So that first component, the resource value, again we're just using the time-dependent valuation that is applied to all the measures that are posed here. In this round of the standards update process we've gone back and we've looked at the TDV methodology and we've made some revisions to it to reflect better the cost of providing

energy on those really super critical top 100 hours of the year.

So this chart shows the comparison of the TDV values we had in 2005; and the TDV values after this revision in 2008. What you'll notice is two things. One is that the average increase in the TDV values is about 10 percent. Okay, that is directly from the fact that retail electricity rates in California in real terms have gone up about 10 percent.

The second piece that's probably more important for this case is that there are higher peaks. So we've gone back; we've looked at those top hours. And looked at what the resource savings is really in those top 100 hours.

Of course, that gives you the value per kilowatt hour or TDV unit in each hour that you're saving. The other side of that is well, what's my load reduction. So, our team, led by Hirsch and Associates, did some modelings, pretty significant modeling of what the load reductions are that we could expect from a PCT.

This, they've used DOEII building models. The building types have gone through were a small office, small retail and single family. I

put this table up. There's a lot more details in the report. They've done, for each of these building types, a lot of variations in terms of, you know, of course the climate zones, orientation, and other factors.

The second thing that they've done is really looked at, okay, what's the hottest and tenth hottest days -- and I'll go into why we chose hottest and tenth hottest days in a minute -- in each climate zone.

Okay, so those are to be reflective of well when are we going to be operating the PCT. Okay, or when is the customer going to be choosing to operate the PCT. That's sort of the overview on the resource value.

In terms of the emergency value it looks quite a bit different. Instead of looking at, well, how many therms of gas are we saving at the power plant, or what are our losses, instead we've changed the perspective and we're looking at, well, what does it cost California when we have rotating blackouts.

And the numbers dramatically increase. The weighted average, okay, across all the classes in California -- and this is a summary of three

different surveys; two by PG&E and one by Edison -- gives us a number around $42 per kilowatt hour of unserved energy for a rotating blackout. Probably not a big surprise to anybody that that's really a costly issue.

Now, the good news is it's rare and hopefully the PCT application can make it rarer, still.

The analysis approach we've taken is to lay out what the fundamental assumptions are in terms of how the PCT will operate, how the programs will be put together that customers will respond to. And then lay out a sort of basecase best estimate of what we think the program will be. And then look at more optimistic and very optimistic cases, and pessimistic and very pessimistic.

So we've tried to do some sensitivity analysis around what the programs will look and how they'll work.

This case study is looking at the technology of the PCT. There's still some uncertainties about exactly what the program will look like, the customers will participate with the PCT, and so we've tried to bound that.

Let's see, I wanted to point out a few of the key analysis assumptions and then I'll just show you an example for residential customer in a particular climate zone. And we'll be able to go back and look at the assumptions. And then in public comment period people can ask.

Looking at our basecase we're talking about something like 15 days a year of operation from 2:00 p.m. to 6:00 p.m. with a four-degree temperature setup. In terms of the 15 days, override is possible. So you don't have to have your thermostat set up. You can basically push a button or have some other feature to be able to just keep your air conditioner at its normal setting.

In terms of assigning the resource value we looked at the highest TDV value days. So those are the highest 15 days in a particular climate zone. Highest value days, in terms of the load impact, we used in the basecase the tenth hottest day as the amount of response. Of course, if you look at the hottest day you get a little bit more reduction from your PCT operation, because the temperatures are a little more extreme. So this is a little bit more of a conservative assumption.

In terms of people participating we assumed 70 percent of customers that have the PCT would be participating. We went over the economics.

Other set of assumptions, I'm not sure we need to go through them all. A number of folks will have their thermostat off because they're not home, so we've kind of derated for that. The number of folks who override, et cetera.

Let me go through an analysis example. I think it will make it a little more clear, and then going through the table of assumptions.

Again, we've got our two components, resource value and emergency value. Our example was to look at residential climate zone 12. And, again, we've done residential and nonresidential for all the zones and those are in the report, but I thought it might be good to do this example.

We used basecase assumptions for this, give you a sense. So if you start out with this simulation of well, what do I get for a PCT that's on and operating. What we started to look at is well, we need some deration factors. We need a deration factor for the percentage of air conditioners that are actually on. We need a

deration for the percentage that are actually working, receiving a signal and all of that. And then we need a percentage of the people who don't choose to override. Okay. That gives us about 74 percent.

And then we have, well, okay, how many people in this are actually participating in our program. Okay. And what we end up with on the resource value side is 52 percent or so of the actual installed PCTs are going to lead to load reduction when you finish adjustments.

If the average simulated kilowatt reductions are .87, in this type of customer and this climate zone, then the average kilowatt reduction per thermostat installed is about .45 kW. Okay, so that's an overview of the process there.

Now, of course, we've got these simulations that I was mentioning. We've got the TDV values. So, okay, we've got .45 kW, but what's the shape and what's the value. And, again, this looks just like another measure would be evaluated. This is just one day, but I think it shows the point.

The magenta line here -- I'm not sure if

people can see the cursor, but the magenta shows the load reduction on the building. So, we've got load reduction here in the period from 2:00 p.m. to 6:00 p.m. The load reduction is a little negative afterwards, as the building cools back down.

Then on the blue line we've got the TDV value. Okay. And that's, I'm not sure the units are on here. Well, oh, yeah, here's zero. And so we've got the TDV value. And, of course, the TDV value is considerably higher during this period in the hot summer, hottest days of the year in the summer. And so we've got load reduction times value just like you would in another measure. And we do that for our 15 highest value days in the basecase. Sum those up and that gives us the resource value piece.

If you do that in this zone for this customer you end up with something like $271 per ton present value. Then we've got how large the air conditioner is in that zone times our 52 percent gives us a lifecycle value, in terms of the resource value, of about $390 for this example. And that includes our 52 percent deration factor.

We also have a piece in here to take a look at well, yes, but now I'm hotter because I've been participating in this and my thermostat has been reset. So we take off in the basecase 20 percent of the value as compensation basically for being warmer. Gives us a net resource value of $314 for this example. And, again, we've done a number of them.

This explains how we got to the 20 percent value. It was part of our workshop materials. I think I'm going to leave this one for questions, to be able to answer questions if they come up in the discussion part of this program.

The second piece that we were going to talk about was well, how do we estimate the emergency value. And, again, it's what load reduction times a number of derating factors. And, again, we're looking at just the additional amount of load reduction we get during an emergency event on top of what we would have gotten if we had just operated the PCT in its normal process.

And the way we've done that is to go through the same set of assumptions, but in this

case instead of allowing people to override an emergency case, we've disabled the override feature. So, if you have a PCT installed it will reset your thermostat during that period that you would have otherwise had a blackout, and there's not an option to override.

By disabling that feature we get a little more load reduction. It depends -- the exact amount depends on whether you'll apply this to participants only, or all PCT owners. And those are assumptions. The basecase assumption was that those participating would be subject to the emergency case. And you end up with about 6 percent additional load reduction that you get during that emergency.

Taking our simulated kilowatt reduction of .87 we end up with incremental emergency kilowatts of .05 kW. Okay. Per installed thermostat.

Looking at this, then similarly we take, all right, well, what was our weighted average of cost of having a blackout. Again, we net off a value for comfort and productivity loss. Remember under the resource value we had netted off 20 percent. Under the emergency value we've actually

netted off a larger amount because the participation is no longer voluntary. The $2.50 is based on a number of studies of the value of service lost for customers that participated in A/C cycling programs in California in the past.

Gives us a net sort of benefit, we're substituting blackouts for warmer temperatures, gives us a net benefit of $39.50. And if you multiply through, down through your average reduction you end up with, at the end of the day, lifecycle net benefit, additional benefit of $93.52 for per installed thermostat.

I know I went through that quickly. And this is the citing of the studies that we used to develop the $2.50 per kilowatt hour estimate.

What we just walked through was briefly the resource value gives us 314, the emergency value 94; you add those up, and the lifecycle, basecase estimate for lifecycle value of the PCT climate zone 12 is around $408 per thermostat.

And this just reiterates the amount of savings that we intend to have, or we expect based on the simulation and participation estimates.

One additional piece that we looked at that's also in our report is the environmental

impact. This is commonly looked at for a case study. And we looked at it for PCTs, as well. And what we found when we looked at the environmental piece is that we're really not saving a whole lot of energy. Okay. We've moving energy consumption from the period when the temperature is adjusted up to later in the day when the building has cooled back down.

And so what we find is the emissions rates and the savings on the peak period are higher because less efficient plants are operated to keep our loads up during those periods when the PCT is in operation. But we're running more power plants later. And so the net is a small positive, but quite small positive benefit in terms of the environment piece.

I'm going to pass it back to Jon and then we'll be able to finish up. And then we'll go through some questions.

MR. McHUGH: Thanks, Snuller. And the part that Snuller's just showed you is essentially a description of the methodology section of the report. So we've got a big, long, hairy report that describes all of this information and all the steps that Snuller has just brought up.

And then from those steps you understand the logic behind how we calculated the overall savings for PCTs and the overall statewide impacts.

So, in the beginning of this project we had the company ESource perform a survey. They interviewed a series of manufacturers of thermostats that were planning on, or participating in these series of workshops on the PCTs.

And so they asked a series of questions trying to essentially understand approximately what the cost would be under various scenarios of volume. And, of course, as the volume increases the prices go down.

And when we compare that to standard thermostats we're looking at approximately a $60 incremental cost; that's incremental installed cost of the PCT.

You know, these numbers may change over time based on work that's occurring right now with LBNL. And for our analysis we used the predicted lifespan would be 15 years. And that's based off of ASHRAE estimates of lifespan of electronic equipment.

And so in the standards we use a 15-year period of analysis for nonresidential proposals; and for the residential proposals we use a 30-year period of analysis. So, for the residential calculations, we assume that there will be a PCT replacement 15 years out. And when you look at that that has essentially a discounted present worth value of $40. So when we look at the nonres results we're looking at cost effectiveness relative to a present value of $60; for residential we're looking at a present value incremental cost of 60 plus 40, or $100.

This is just summarizing by climate zone the basecase. Remember we had a series of five different cases from very pessimistic to very optimistic. The basecase was in the middle, and this table here lays out the savings. And what you see is that the savings are substantially over $100 for residential; so it's very cost effective. And for nonresidential, the savings are even greater, but the costs are less for our period of analysis. So what this shows is that PCTs are cost effective in all climate zones.

And this table here is just showing what the results are relative to the various

assumptions used from very pessimistic to very optimistic. And what you can see from this table is that the input assumptions are very important in terms of what is the overall cost savings. And some of those include, for instance, whether or not people are opting in to participate in these programs versus opting out.

Opting in is that well, we have this new rate that gives you the opportunity to take full economic advantage of the PCT, and people can choose to do that, and they have to sign up and have to go past their own inertia versus opt out which is you're on this rate, and if you choose not to be on the rate, then you have to decide to do that. And, of course, again inertia you tend to have higher participation rates for the opt-out scenario.

And also the rules under emergency conditions. Will the PCT essentially set your thermostat up 4 degrees regardless of whether or not you choose to. That it can override it or not.

So, this is a -- code proposal, and actually the updates to the standards are quite small, even though they're quite significant. So

we're proposing an adjustment to section 122(c) that would add -- right now there's a requirement for shutoff and reset controls, and we now add the term demand responsive controls. And for residential, for the section 150(i) they have the requirement for setback thermostats; and then we'd add the terms and demand responsive.

And in the code definition section we have some new language describing what a demand responsive thermostat is. Talking about the demand response period and the demand response signal.

And this is in our -- I'm not expecting people to read this here, but essentially what it says is that if the utility provides a demand response signal, the control shall comply with the communication requirements of the utility and be capable of increasing the cooling setpoint by 4 degrees during the demand response period.

And if the control's controlling a heat pump the control will be capable and installed to turn off the resistance heating during the demand response period.

And then there's some exceptions. Now, right here this particular language would actually

apply to all temperature controls of spaces. Our case study is around PCTs, which are stand-alone thermostats.

So if it was desired that the scope be kept narrow and just look at stand-alone thermostats you'd need another exception or some other language in here saying that this is only serving single-zone systems, or something to that effect, that it's describing the stand-alone thermostat.

If, on the other hand, there's been some discussion about later on today we'll hear about the global temperature adjustment requirement for EMS systems, if instead of just having this adjustment that allows someone to manually increase the thermostats in all zones in the building, you actually wanted to automatically set up the thermostats in all zones in the building, then actually you wouldn't need to change this language. So in its simpler form it would actually have a broader scope.

And here's the language for section 150, which is the residential side, and it's pretty much the same language.

So, some other considerations to think

about are who's actually maintaining the PCT specification. Over time, communications, protocols may change. Is there something that should be held at each utility, since in general dispatch has traditionally been controlled by the local utility. Should it be by the ISO. Should it be by the CEC.

To some extent the work that LBNL's been working on has been looking at a statewide specification for PCTs in Title 24. I think that's some of the issues that still need to be worked out.

There's also been some discussion about that the PCTs should also set back thermostat setpoints to reduce peak gas consumption in the winter.

And as I mentioned earlier, there might be decision to try to expand this to a wider range of buildings. If we look at expanding the demand responsive control to not just stand-alone thermostats, but also to built-up systems and systems that are traditionally controlled by energy management systems, that would increase the statewide nonresidential peak savings by around 50 percent. And, you know, we haven't studied that,

but it's my expectation that there's greater savings for similar cost per control, and it would be even more cost effective. But there's another project that's looking at that.

The PG&E variable air volume or -- to the zone case report will also address the demand responsive aspects of ECMS systems, as well. So, you'll be hearing more.

Now, for more information, references to the work that we've conducted, there's this website. And then, of course, there's the draft case report that's on the Commission website. And it's listed here.

And I would just like to thank all of our sponsors and all the people that worked very hard on this project. And without further ado, we're ready for questions.

MR. SHIRAKH: Mike, would you come up to the podium.

MR. GABEL: Mike Gabel from CABEC. One question I have is whether you guys thought about only making the requirement when mechanical cooling is involved, so that if a house is in an area where there really is no air conditioning it would never be required until the owner actually

installed air conditioning, at which time the mandatory measure would then perhaps kick in. Had you guys thought about that for code language? Or actually, the same in commercial buildings, as well.

MR. McHUGH: Yeah, this is for controls that are controlling air conditioning, so --

MR. GABEL: So, in other words the standards are clear then, buildings with heating only this is not a requirement?

MR. McHUGH: This currently would not apply, --

MR. GABEL: Okay.

MR. McHUGH: -- but there's still some discussion about whether or not this should also apply to gas appliances, too, furnaces.

MR. GABEL: Okay, thanks.

MR. RAYMER: Bob Raymer with CBIA. What would be involved in retrofitting an existing home, like something we've built over the last 20 years?

MR. McHUGH: This would involve replacing the thermostat and in some cases -- well, there's still some issue about how the thermostat is communicating with the utility

network.

MR. RAYMER: Um-hum.

MR. McHUGH: One theory is that it would be receiving a signal that's FM and so then there's no additional infrastructure besides placing the thermostat in place.

In the cases where it's interacting with all the advanced metering infrastructure, the utility is putting in this meter and then the meter's communicating to the thermostat. And that could be by a variety of technologies.

MR. RAYMER: At the very least --

MR. McHUGH: So it's like power line carrier, for instance, --

MR. RAYMER: -- there is a possibility here, though?

MR. McHUGH: To retrofit?

MR. RAYMER: Yeah.

MR. McHUGH: Absolutely, yeah.

MR. ELEY: This is Charles Eley. A couple of questions. Have you estimated the percent of new building construction that would be affected, nonresidential new building construction that would be affected by this?

MR. McHUGH: Yes. In terms of -- I mean

essentially every new building that has a single, you know, single-zone air conditioner. And we actually made use of the AEC research for the small commercial rooftop project where they went through the nonresidential new construction database and identified that essentially 70 percent of the tonnage, installed tonnage, in commercial buildings are single-zone systems, non-built-up systems.

MR. ELEY: Okay, roughly 70 percent then.

MR. McHUGH: What's that?

MR. ELEY: Roughly 70 percent?

MR. McHUGH: Seventy percent, that's correct.

MR. ELEY: Okay.

MR. McHUGH: I'm sorry, 70 percent of air conditioned space; and so, you know, there's still --

MR. ELEY: Okay.

MR. McHUGH: Yeah.

MS. HEBERT: Further comments, questions? Please step up to a microphone and introduce yourself.

MR. WATSON: Hi. Dave Watson, Lawrence

Berkeley National Lab. With your discussion of using the PCT concept in commercial buildings, have you considered the transmission issues of getting a signal into a large steel and concrete building, which may be quite different than a wood residential building?

MR. McHUGH: The focus of this is the stand-alone PCT. Now you're talking about in terms of the EMS system? Or are you talking about in terms of stand-alone thermostats?

MR. WATSON: A large commercial facility with an EMS system.

MR. McHUGH: Okay. So, assuming that we have the advanced metering infrastructure in place, you actually have a meter that's receiving the signal. And then that meter can communicate via power line carrier, or could be, you know, some other technology, or could even be, you know, ethernet to the EMS system.

So I think there's a number of ways of getting through there. You don't necessarily have to rely on radio signals or anything like that to communicate to your EMS system.

MR. WATSON: Okay, thank you.

MS. HEBERT: Anyone else? Please step

forward.

MR. RAZIVRI: Carli Razivri, L.A. County. Is this going to be a mandatory measure requirement or a credit?

MR. McHUGH: A mandatory measure requirement.

MR. RAZIVRI: Thank you.

MS. HEBERT: Anyone else? Bruce.

MR. MAEDA: Bruce Maeda, California Energy Commission Staff. I was a little concerned about climate zone 1, even though it is the lowest one it's still surprising that it has much of any useful energy in terms of significance.

And then I am also concerned about the sensitivity to the assumptions because it makes a great deal of difference in terms of the cost effectiveness, so.

MR. McHUGH: Yeah, that's a good point. So, the -- first off, in climate zone 1, these are only buildings that have thermostats, so -- that have air conditioning; and depending on the assumptions that you use, in some cases there are little to no savings. But, based on the basecase savings, they do have savings that render the PCT cost effective. But it is the climate zone with

the least amount of savings.

MS. HEBERT: Yes, Bill.

MR. MATTINSON: Bill Mattinson with CABEC. I think this is really exciting stuff. But just one question on the other side. If this becomes a mandatory installation for new buildings starting in 2008, when are the utilities going to have their part of this infrastructure in place so that the results begin to happen? Do we have any projections on that?

MR. McHUGH: I'd like to introduce Carlos Haiad.

(Laughter.)

MR. HAIAD: Carlos Haiad, Southern California Edison. In the case of SCE, by 2013. PG&E, I believe will be at least three years earlier, at least. I'm not sure about San Diego Gas and Electric.

COMMISSIONER ROSENFELD: Carlos, maybe I -- this is Art Rosenfeld, Energy Commissioner -- maybe I should, since my full-time job is to nag at people like Carlos, and I'll turn my phone off --

(Laughter.)

COMMISSIONER ROSENFELD: The utilities

are spread out all over the map, so PG&E is pretty confident that it's going to get approval this spring for starting a $2.2 billion, $2.2 billion installation program with the advanced meters in October or November. They will start in hot communities so it won't be all over the place. I think they're going to start in like Vacaville.

And it will take them about three years, apart from some tails of laggards.

My understanding is that Sempra is about a year behind that. And again, like a three-year plan. And Edison, despite our greatest nagging, is following them by a few years.

So, basically for the whole state it's going to be, as Carlos says, about a ten-year installation problem. But, on the other hand, the half-full point says that the glass will be half full by five years from now. And 2008 is only three years from now.

So there will be un-used thermostats installed; that's a problem. On the other hand, you would hardly want to have installed just an old fashioned clock thermostat in a building, and then take it out two years later. So that's sort of the argument.

And I think -- does that answer your question?

MR. MATTINSON: Yeah.

MR. ELEY: This is Charles Eley. I have a question related to that. If the -- it sounds like then that we would incur the expense of these thermostats starting in 2008 but we wouldn't get the benefits until several years later?

MR. HAIAD: Yes.

MR. ELEY: Was that accounted for? Am I understanding that correctly?

MR. McHUGH: Well, actually how we've written this version of the proposal is that the thermostats aren't required until the utility has a program in place.

MR. PENNINGTON: So, Charles, --

MS. HEBERT: I see a hand sort of waving.

MR. PENNINGTON: -- Charles, just to respond to that, I think there is sort of a lack of consistency between what Commissioner Rosenfeld is describing as the Commission's preferred way to --

MR. ELEY: That's why I asked --

MR. PENNINGTON: -- approach this. And

maybe your point's well taken related to the analysis.

MR. RAYMER: Bob Raymer with CBIA again. It seems, though, as the Commissioner indicated, that rather than go back two to three years and start replacing boxes, why not just do it at the -- not that we love being regulated, but this seems to make a lot of sense here. So, --

MR. PENNINGTON: Can we quote you on that?

MR. RAYMER: -- not right now, you know, but --

(Laughter.)

MR. RAYMER: -- we're also looking at a possible program of going back and retrofitting a lot of houses that have already been built with this. Why start building them without this?

And I still don't understand, and this is probably a political question, why Edison is so far down the curve on getting the metering in. I heard 2013, right?

COMMISSIONER ROSENFELD: Full deployment. You're hearing numbers like 2009 if I quote Carlos correctly for initial deployment of Edison.

MR. PENNINGTON: I have a question. Stay there if you want. Has there been any consideration in the utilities' rollouts about doing new construction as a first priority within their rollouts?

COMMISSIONER ROSENFELD: Oh, yeah. We have discussed this sensitive point with the utilities. And I think it's fair to say that all three have been encouraging us to go ahead. They will put the new-fangled meters physically in all new buildings. Now, they may not have a communications circuit for them in Oakland or something where there's not a hell of a lot of air conditioners. But they do intend to put the new meters in place. So the meters will go in place --

MR. RAYMER: Then they'll have the infrastructure in line as time goes on?

COMMISSIONER ROSENFELD: That's right.

MR. SHIRAKH: This is Mazi Shirakh, CEC Staff. There's also another version of the proposed code language that's prepared by the staff. And that one would require PCTs to be installed when the 2008 standards go into effect all over the state, so it's still work in

progress.

MS. HEBERT: Ron has some comments.

MR. HOFMANN: I'm Ron Hofmann; I'm a consultant for CIEE. One scenario which hasn't been decided on yet is that the PCTs, as they go in, if they were to hear a broadcast signal, for example, could be used for reliability without AMI. AMI is not needed for reliability issues, because no crisis is associated with it.

Cal-ISO might need monitoring at 50 megawatt substations in order to prove that, in fact, they're getting the response that they want. But, in fact, the PCTs could be used for that function if, in fact, the way you got them the signal was not through the AMI infrastructure.

COMMISSIONER ROSENFELD: And I think, although I'm beginning to sound partisan on this, that I would like to make that point a little bit in addition. It couldn't show up in Snuller Price's sort of cold economic analysis.

And that is what we're entering here is an era in which wind is a real shortage, and it could be just location, or it could be just the San Francisco Peninsula. Then, instead of having what I consider to be pre, crude rotating outages,

that in this case all that will go off will be your thermostat or your heater.

And Snuller -- the discussion also didn't point out that there will be a signal relayed around the house so that also other appliances are likely to easily turn off. The pool pump, for sure, and electric resistance hot water if it's the air, and your dryer.

Right now the problem with rotating outages is that although PG&E, for example, has something like 14 rotating outage zones, half of the houses in the state are not subject to rotating outages because they're on the same circuit as some essential service.

So, a few, a relatively few houses bear a very tough response in which not only does their house go dark, but their computer goes dark and all sorts of other important things go dark.

This way you would have -- you could get the same number of kilowatts and people would barely notice if their thermostat went off or their pool pump went off for a few hours.

So there's a definite -- policy, I guess I'm supposed to be the policy guy, there's a definite policy advantage to going into softer,

smarter outages than -- which didn't show up in the economic analysis.

And I think that's one reason that the utilities are eager to answer Bill's questions of yes, they will go support the idea of new dwellings and new small commercial.

End of sermon.

MS. HEBERT: Carlos.

MR. HAIAD: Carlos Haiad, Southern California Edison.

MR. PENNINGTON: Why is Edison so slow and -- never mind, never mind.

(Laughter.)

MR. HAIAD: Well, we want the better meter, what can I tell you?

COMMISSIONER ROSENFELD: Yeah, Carlos, can we talk at lunchtime?

(Laughter.)

MR. HAIAD: In addressing the retrofit, in one of our own case scenarios we would deploy about a million of those thermostats in the next five years on our own. So, and that would be all retrofit, all retrofit.

We would pick up the new construction to add the meters in there, but we are envisioning,

this is a resource for us, and there is case scenarios that we have done that we will deploy that many in a five-year span.

MS. HEBERT: Any further discussion? All right, seeing none, I'm going to bring up the next presentation here and the next speaker.

(Pause.)

MS. HEBERT: There we go. Okay, you heard from him a minute ago. This is Ron Hofmann who is a consultant with CIEE, which is the California Institute for Energy and Environment. And he's going to give us an update on the PCT workshop that we held last week. So, Ron, please step up.

MR. HOFMANN: Good morning, again. Although the focus of my talk this morning is going to be on the workshop that occurred one week ago at the Secretary of State Building, I will be drifting a little bit to some of the other issues that have supported that workshop, because some of you don't know all of the history behind how that workshop came about.

So, first of all, I'd like to tell you that the workshop that occurred last Thursday was the third in the series of PIER workshops that

dealt with what we call system integration issues. System integration issues as they relate to advanced metering infrastructure and programmable communicating interfaces. And if I had more space on this slide I could tell you that they would also relate to pool pumps and other load devices that might respond to a signal.

The first workshop occurred a year ago February, February 1st of 2005. And it looked at issues related to information exchange, seamless information exchange between stakeholders that were involved in AMI and PCTs. And these stakeholders included the IOUs clearly, the Cal-ISO, energy service providers and probably most importantly, customers and how they fit into an infrastructure that allowed information to be exchanged.

The second workshop which occurred last November, November 29, 2005, presented a vision of PCTs, both in trying to synthesize what policy was trying to achieve, trying to synthesize that into more of technical verbiage. And actually gave a "how it might be done", a strawman. Not so much as to tell you that that's the way it was supposed to be done, but to show you that there were ideas

that could be evaluated with respect to PCTs that might be new and novel, and in fact, might make the whole PCT deployment cheaper, better, faster.

And then, of course, the third workshop, which is what I want to talk about today, focused on manufacturer and investor-owned utility feedback on what was presented in the November 29th workshop.

So just some quick background for those of you who are not familiar with PIER. PIER is Public Interest Energy Research, and in terms of what's going on here it does two things: It supports policy and informs policy. So, as we go through the rest of my talk, you'll see where a little bit of both of that is going on.

So, on the support side we're attending meetings related to the Energy Action Plan, the working groups that are related to demand response, these Title 24 proceedings. And out of that we are trying to understand how the research that we're funding can help support the policies that are being developed in those venues.

In addition to that, we try to look ahead in order to inform policy to evaluate technology, costs and concepts that may not be

considered by some of the policymakers, the decisionmakers, just because they're not familiar with a particular technology.

And then we're trying to create not products, but proof of concept test beds, and cross-cutting dialogues between the researchers so that, in fact, something useful can come back to the decisionmakers.

So, earlier this morning you heard from Jon McHugh, and I think he clearly described what policymakers want at a very high level. Is that 60,000 feet or 30,000 feet, I don't think that's important. But what I've put up here on the screen is what might be the next level down. It's clearly not the details yet.

But this was a slide that was actually presented at the November 29th workshop in trying to say what do policymakers want. What are they really trying to say. And whether these particular bullet points actually get into the standards or not, I think what this has done and was proven by the third workshop, which I'll talk a little bit more about, is that it absolutely stimulated discussion, which is one of PIER's roles.

So the first bullet says that one programmable communicating thermostat system integratable interface for all of California. You notice it doesn't say one thermostat for all of California. There are many vendors. But the issue is that if you buy a thermostat from one vendor in one place will it work with multiple utilities or not. Now, that can be a policy decision, and I'll talk a little bit about what the manufacturers and the IOUs said last week in responding to this.

But the concept in interpreting what the policymakers want is essentially that this might be a retail purchase item at a Home Depot, either by a contractor or an end user. Might be purchased wholesale. But it's either contractor or consumer installed and maintained as a general concept to support customer choice.

With a system that supports a common system integratable interface. I'm emphasizing that so you get the idea that it isn't the thermostat, itself, it's the interfaces that the thermostat has to the system that we're focusing on.

There needs to be some sort of a common

signaling throughout California, whether that means one-way or two-way, yet to be determined. Whether that means one protocol or two protocols or multiple protocols, that's to be determined. But there needs to be some sort of a rationalized signaling system so that the ISO and the utilities can work together and decide how to do this.

In general I would say that the utilities will push the button, but they're going to be working in concert with the ISO. And maybe other stakeholders, maybe the regulators, I don't know.

And it has to work with what I call a minimum AMI system. And a minimum AMI system, the way I've defined it, is that it's totally separate from the demand responsive system and only connected through time synchronization.

Now, Southern California Edison is doing a very interesting project right now to evaluate a more advanced state-of-the-art meter that would be a gateway into the home that could be used both for demand response and for AMI. And this does not preclude that, because there, there would be physical synchronization, and that's fine.

But one of the utilities, PG&E, has a

system that may or may not be used for DR because they have low band width, or low baud rate in their AMI system. It still has some room for demand response but will it have enough room to do all the demand responsive things that the Commissioners have in mind for the state.

So, there's just questions here. So, at the very minimum there has to be a time synchronization between the two systems. They might be physically connected or not; that's to be decided.

And then finally, in life we always have legacy systems. So today's new technology will be tomorrow's legacy systems. Somebody like Carlos Haiad knows this very well; he deals with it all the time. It just never goes away. If 20 years ago he ever thought he was going to get over legacy systems, he certainly knows today that doesn't go away.

So we have to consider a system that deals with constant legacy hardware. And I added to this he idea, because I went to a workshop at Southern California Edison in which thermostat manufacturers got up and showed what they have, prior to PCTs. And they're very rich in

technology and certainly one would not want to lose that richness in technology.

So, this is a summary of what we said in the second workshop in November of what we thought policymakers were really saying to us.

And then we put together a how, a strawman-how, but we said very clearly at the end of the workshop that, in fact, the how should be worked out by the industry, the utilities, as well as the manufacturers.

The four sub-bullets on the strawman concept have received a lot of press because a lot of people thought that's what was being specified. But, in fact, the how that was specified in terms of a one-way signal that was a side band of an AM/FM system was just to show a concept that the state needs longevity on the system. You can't pick a two-way system today, or a one-way system today, that in a few years is going to become old hat.

A lot of people proposed ZigBee. ZigBee is not established yet. Will it be here five years from now? You have to ask that question. So we proposed a concept of a one-way signaling system that could underlie any other two-way

system that we knew was going to be here for the next 20 years. And that's side bands, the standard AM/FM broadcast system.

As you know, automobiles now use this for being able to display digital data on an LCD in a car to tell you what music you're listening to.

We also asked the question, or we proposed a how that said, you know what, if we're going to make a big change to thermostats at this time, do we really want terminal strips around for the future. How about a possibility that this one time when we're starting to change things we have a common interface to HVAC equipment. And we have sort of a plug-in capability. So we proposed a plug-in concept, a connection.

We also took a scene from the PC world and the telephone world and all those worlds always have what's called a backdoor, an expansion port. In PCs, from day one, it was RS232C. And expansion ports are very useful because it allows both the utilities to stay, and other people, to explore new applications that weren't originally thought of when the PCTs were rolled out. And so the concept of an expansion port was proposed, and

a particular incarnation was proposed.

And then finally we called attention to everybody that you could use the standard interfaces that exist now, and some of them are very sophisticated, but there was at least two options that had to be considered and had to be thought about.

One was the override button, and if people didn't want to have their thermostat set point set up a few degrees in an economic situation, did the override button have to be a big red button on the unit, or could it be part of the display. Would people get frustrated if they just didn't have that quick lever that said, I don't care what I have to pay, I still want my air conditioner on. So, just questions to ask.

And then there's the additional human information that tells you that your device is actually hearing the signals; that you have the confidence to know that at the end of the month you're not going to get a bill that reflects the fact that your unit was broken. And who's responsible for that, the utility or the end user.

But I just want to repeat again, the key thing on this slide is that this is to be worked

out by industry. And that's why we had the workshop last week was to get industry's feedback. And we got a lot of feedback, a lot of feedback.

So, at the workshop, finally getting down to what my presentation is all about, what you're seeing in the black are the normal introductory kinds of things where Mark Rawson, myself, Mazi and Art gave introductory and welcoming information to get everybody on the same page. But the key to the day was two industry panels and public discussion.

In the panels we had one panel made up of thermostat manufacturers, specifically two manufacturers accepted our invitations, Honeywell and White Rodgers. And all three investor-owned utilities responded, and three members of those utilities, three representatives of those utilities were present to be on the panels.

Now, there were other people in the audience, and our audience was made up both of physically people sitting there, and there was also a WebEx. And between the two we had about 100 people.

And in the audience, in addition to these people which I recognized by looking at the

screen during the workshop, I have since looked at the people who were signed up, and there was also ComMerge, Whirlpool and TWAX, DCSI present. So we had a number of both large and small manufacturers represented.

I only recognized that SMUD was there, but there may have been representatives of other -- of municipal utilities, as well.

So, let's get down to a little bit of what was said, and what this means to your process in Title 24.

Honeywell had a two-slide presentation -- I'll show you versions of those slides in a minute -- in effect where they simply said they support the initiative in concept and they look forward to participating.

They pointed out that HVAC systems are evolving so that it's not about the thermostat anymore. The thermostat may just be an interface device. And where there are today four-wire, ten-wire, 18-wire connections to various HVAC systems, the thermostat of the future is probably going to be no more than a two-wire communication link. And all of the smarts is going to go to the HVAC equipment, itself.

So, that's something that's worth everybody's knowledge about, because that affects how we think about how we interface these things now, what our legacy systems are going to look like in the future.

Dan O'Donnell, who gave his presentation, said the focus should be on ease of use for the customer; and he defined the customer as the homeowner or the contractor -- and the contractor.

And then Dan made a big point about this, he said he wanted the CEC to understand that the HVAC market dynamics are potentially the most important barrier in deploying PCTs. And he gave an example, and he said, who's going to get the callback for servicing the thermostat under this new environment. And he said that although he's supportive of the whole process, it's the little niggley details like that that bother him and keep him awake at night.

So, there are two slides that I'm going to show you really quickly, I don't expect you to read, in which he suggested that the wording be changed such that we focus on the HVAC system, rather than the thermostat. Mazi pointed out to

him that we may not have -- we, being the CEC -- may not have regulatory control over the HVAC equipment, itself. And so therefore this may be a moot point. But I think his point was well taken, that in the future this, although PIER is looked at sort of system integration issues, there's a sub-system integration issue that's changing, as well, as to where the smarts are going to be within HVAC equipment. And so those issues are going to come up in your deliberations about PCTs.

He had some language changes that you can see, these presentations will be posted so you can take a look at what they were. But, again, his emphasis was that he really wasn't changing anything that was going on here, but he was emphasizing it's the HVAC system that you should be worrying about, not just the thermostat. But I think the CEC only has the potential to affect the thermostat in the near term.

White Rodgers' position statement. They didn't have any VuGraphs, they read a prepared statement. But I think these two sentences pretty much capture what they said. And I've had subsequent conversations with them. They support the CEC strawman, which we weren't even asking

them to do; we were asking them to comment on the WHAT, not the HOW.

But they support the strawman design, except that they didn't like the expansion port being a USB port. They do like the expansion idea and they suggested that maybe there should be a wireless, a two-way wireless capability that allowed for upgrades and other expansion things like auditing that might not be in the original spec.

In the afternoon we had a utility panel. And Terry Mohn, who's identified there in red, was the presenter for all three utilities. And I saw something for the first time that I haven't seen in about 12 years. I've been in the utility industry a very long time. And this used to be common fare in the '70s and '80s, but in the '90s this all fell apart, where utilities worked together.

And so a joint utilities presentation was made in which all of the people that are listed here apparently played a role in putting together Terry Mohn's presentation.

And before I make any comments about the presentation I have just copied the last two

slides, points from the last two slides of the IOU position, to tell you that we really don't have anything definitive from the IOUs yet. They've just gotten this group together; they hope to move very quickly; they sound very responsive.

And they said that they're committed to working with all the pertinent stakeholders during the first and second quarters of 2006 to fully address the communications requirements, options, costs and risks to facilitate the development of the Title 24 PCT.

And secondarily they said towards this commitment they are hoping to schedule a planning meeting by the end of this month, and that they would work with Mazi in trying to work out their schedule to be consistent with the CEC's position.

Let's just go back for a second. So, with those two things said, so you know what their last two slides were all about, let me tell you what I and my consultant gleaned from the combination of statements made by the manufacturers and the IOUs.

The manufacturers have in the past, in the demand response arena, had as their customers the IOUs. And so they're walking a very fine line

here. If, in fact, the PCT becomes a product that is sold outside of the standard IOU channel, let's call it, that's a funny name, but IOU channel, and they're not sure whether they're going to still be selling to the IOUs or selling directly to contractors and customers with the PCT.

When it comes to standard thermostats you all know, they sell them through a variety of channels that are direct to the end user. But with DR, up to now it's been programs. And so they're a little bit conflicted here about where they stand.

So, for example, when the IOUs stated at one point that they don't want to support multiple communication systems for interfacing the customer, a very reasonable thing to say, because, you know, if there's added cost in having multiple communication systems they certainly don't want to add that cost, the manufacturers were somewhat conflicted because they would like on system for the whole state, because the more they can make of one type the cheaper the product is.

So, there's somewhere in between those two positions that the IOUs and the manufacturers are going to have to work out what their

objectives are.

The IOUs have stated that two-way communications are necessary to make their business cases, at least Southern California Edison made that case strongly. Terry Mohn said it for San Diego Gas and Electric, as well. PG&E did not say that. They apparently have made the case without that. But maybe they believe it, as well.

And so the question becomes again, whose two-way system will be used in the state if you want the same system in the state. So there's potential tension there.

And it was pretty clear, and I'll let -- I'm sure Carlos will comment on this if I've misquoted him, and I don't mean to misquote him, I'm trying to present this perfectly -- is that the IOUs still want control of their customers. And they want to enroll the customers in programs, verify and validate that the customers are actually participating -- I hope I got this right, Carlos -- and so in their own mind there's a question about it.

There's a broadcast system, for example, whether or not that undermines the position that

they've taken. Whether there's a cost issue or not. Let's say the broadcast system was for free. Would they actually want it there because it might undermine them and their ability to deal with their customers.

And then the question is what do the Commissioners think about that issue.

So I'm giving you just a bit of a flavor of some of the sort of what I would call, and my consultant, Erich Gunther grabbed as sort of some of the key issues that were discussed during the day, that might lead to future discussion and compromise.

So, during this process of dealing with these three workshops there were a number of things that PIER has been doing to support the Title 24 process. And I put this up on a slide so that you know the issues that we're addressing. We're not addressing policy; we're trying to address things like system integration, controls and communication, the issue of stranded assets, you know, what do you do with legacy systems. What if you make the wrong choice.

How do you do incremental upgrades as opposed to having to do what some people call a

forklift upgrade, or tear it out and put something else new in. How do we deal with the new sense of customer choice associated with demand response. And how do we deal with open systems.

On the side where we're trying to inform the Title 24 process -- I just have two more slides, that's what these two are -- PIER is actually trying to look ahead a little bit and trying to help both the IOUs and the Commissioners think about these issues in a different way.

So, we're creating what we call a test bed in which what we've done is we've identified in the blue areas interface issue areas. Those are areas where we feel that the demand response of PCT could easily slip into the quicksand if we don't address these things carefully.

So these are arbitrarily chosen, these four areas. These are the interfaces to human machine issues, the HVAC equipment, where you might want to do some sort of an expansion port for upgrades or whatever. I'm not even going to define all of the possible applications for that. And then what are you going to do about communications.

And we're creating a test bed that might

be used in order to be able to evaluate these issues. So we're taking our strawman that we presented at the November 29th workshop and we're testing them. But this test bed is not limited to that.

So, we're looking at the possibility where here might be the IOU, and they're sending both time- and space-dependent signaling. And certain PCTs, all PCTs might hear them, but only certain PCTs might respond to them. Or, they might be just sent to certain PCTs. To be decided.

And we're creating a situation in which we're doing a one-way FM side band channel communication to this PCT.

The thermostat is something in the yellow we're not touching at all. That could be anybody's thermostat. We don't care. And we're looking at issues having to do with the human/machine interface, the HVAC interface, the expansion. We're actually looking at things like USB port, but it doesn't have to be a USB port. We're looking at cheap ways to do this.

And the bottomline for what we're trying to do is we're trying to find what are the issues

that can drive costs way down. So we're looking at existing, off-the-shelf modules that might allow us to do any of these four blue functions, where there are existing chips in the dollar range, a dollar, two dollars, three dollars, four dollars, something like that.

And then we're going to publish a bill of materials for those interfaces so that everybody can see them. And we're going to publish a reference design for the information exchange between anybody's thermostat and the interfaces.

And this is being done at the University of California at Berkeley. And that we hope the work will be done by the end of March, and it will be published in April in time for Mazi to have it in his next workshop.

So, that's the end of my talk today. Thank you.

MS. HEBERT: Any comments or questions?

MR. SHIRAKH: I have one, myself. Related to whether the point of entry should be PCTs or air conditioning, and whether we're federally preempted, we are, but there may be actually a way to fashion the language that makes

the main requirement to be in the PCT. And then an exception would be an equivalent system, which could be any point in the system. So that can be done.

MS. HEBERT: Anyone else? All right, thank you, Ron.

Let me bring up the next presentation.

(Pause.)

MR. WATSON: Again, I'm Dave Watson, Lawrence Berkeley National Lab. Thanks for having me here today. I gave an expanded version of this presentation a few months ago. I cut it down quite a bit for background, but today I'm going to talk a little bit more about the code language associated with the proposal known as global temperature adjustment. And this applies to nonresidential systems with energy management control systems.

It's important to point out that the basis for this proposal comes out of research, PIER-sponsored research, that was conducted in three years of field studies. In large commercial buildings, we touched about 30 large buildings, over 10 million square feet of commercial floor space. And the measure that we are suggesting go

into code emerged as the most effective and least objectionable demand response measure out of all those tried.

These are similar curves to probably what you've seen before. When the GTA feature goes into effect you can cut energy use substantially during that period.

I think for those of you who didn't hear my presentation last time, the heart of this proposal is similar to the PCT in that you simply turn the cooling setpoint up to let the HVAC systems coast and provide some savings.

And, you know, it seems logical that these large, expensive, commercial EMCS systems would allow you to do that. But, in fact, they do not. The ability to adjust the temperature setpoint in an entire building facility is generally not available in existing buildings, and it's not being installed in new buildings, either. It's a feature that's just generally not available.

You know, you might wonder, well, what do you get with these types of systems, and, you know, they are effective. But how they work is it requires the operator to change each zone

temperature setpoint individually.

And since even a medium-sized building can have hundreds or even thousands of zones, it's just not practical to do this manually in a commercial facility. Nor is it practical to do it automatically, either.

In our research we did automated demand response and we found that if it has this feature with global temperature adjustment, it enables automated demand response, as well as manual.

I'll just quickly go through these slides. Some of you might have seen them before. To adjust the setpoint in a given zone in a commercial building, an operator might see a screen like this. First click on the building of interest; and then click on the floor of interest; then zoom in to see the floor. This is only half of the floor, mind you.

Then click on the actual zone. And then finally you get to the spot where you can slide some sliders or some other means of adjusting the setpoint. Then, of course, you have to take note of that and put it back at the end of the day if there's time.

This proposal, this is a conceptual

visualization of how this proposal would work. The vast majority of the time the buildings would work just like normal. But, if a DR event were to occur you click it into DR mode by flipping this big software switch. And then the entire building would go into having these setpoints which are more relaxed than they were before presumably.

And, you know, these could be adjusted by the operator, as well. We would call this the absolute implementation because you're setting the entire facility to a given setpoint for heating and one for cooling.

A relative implementation would be where you just relax the setpoints so that each zone, say if it were 70 to 74, it might relax it to be 68 to 76, for example.

But the concept is the same. Most of the time it's in normal mode, but then you click it into GTA mode, and save energy.

What's noteworthy here is that this is a software-only change. There's no added hardware costs. Several vendors offer this feature already at no extra cost. It's not widely known or specified. You know, probably because demand response is not prevalent in all parts of the

country. But the feature is in their entire product line. And the feature just lies there latently waiting to be used at no extra cost until the time when it's needed.

And also, I want to point out that similar features to this are common in the HVAC energy management and control system industry. An example would be night setback. It's a feature that's just kind of in the software only to be enabled as needed.

So, in summary, the costs to implement GTA are negligible; the benefits are large. It enables demand response which I'm calling remotely initiated, either economic or contingency driven. But also it enables demand management which you would think of as daily onsite peak management. A facility manager could use this feature to tweak his own building so as to keep from entering the higher demand charge that he might get otherwise. So it has multiple benefits, like I said, at virtually no extra cost.

Before I go too heavily into the code language here, I'll just mention a couple things that I was going to add in here. The key point of GTA, without getting into too much technical

detail, is that this software change goes into each of those individual zone controllers. So this little piece of software goes into may thousands of controllers in a given site. That's why it's not easy to add in the field.

You know, you probably all patched your home computers with just, you know, click on a couple buttons and your computer upgrades. It's not that easy with these small embedded controllers; maybe only cost a couple hundred dollars, and are installed in ceilings all around us.

Yes, you can communicate with them remotely; you can make software modifications, but it's not easy. It's costly. And if one of them locks up while you're trying to do that, a technician will have to climb on a ladder up above the ceiling to literally tear the unit out.

So the main goal of this measure is to get the EMCS manufacturers to add this minor software feature to each of these individual zone controllers at the factory. It's done in the factory; it's a one-time cost. We're estimating the range of $10- to $50,000 programming cost one time in the factory. Then forevermore that will

be part of their standard product line, and just out there in the field ready to be used if needed, without detracting or adding cost to any project along the way.

So, the other point that I want to make is that no new communication infrastructure is needed. Once this feature is installed in the field, you know, using today's communication infrastructure, which it consists of utility sending out pages in emails to building managers saying, tomorrow is a CPP day, or, you know, you need to curtail your load during these periods for a demand bid programs or whatever program it is, generally they're initiated using telephones, pagers and emails.

This measure allows those same communication methods to work. And it gives building managers the capability to take actions on their own buildings that are very effective, minimally objectionable to occupants, you know, at no cost, with no new communication infrastructure required.

That being said, if there is a new communication infrastructure, whether it's wireless, internet, whatever, having all these

thousands of embedded devices with this feature ready to shed load when called upon, 95 percent of the work is done.

In other words, if a new communication signal technology becomes available most of the work is done by having these field units already deployed with this software.

And this has been proven in our field tests, as well. Several of the sites, including Cisco Systems was a 6 million square foot commercial facility when they decided to join our automated demand response program. It was a matter of a few hours of programming to enable all those thousands of zone controllers to listen to our automated signal. They were one of the few sites that had already -- they used a manufacturer who included this feature from the factory.

So we want other manufacturers also to include this feature. We think it's a very low-cost and very effective thing to do. And it is compatible even with manual demand response, or future remotely initiated demand response.

So, here's some code language that fits into section 122(b). Actually, one of the things that I was going to change was the actual amount

of decrease or increase is open to discussion. I would probably suggest 3 degrees, maybe 4 degrees. That's open to discussion.

In practice, if a manufacturer goes to the trouble of implementing this, they'll probably make it adjustable. The ones that are already out there in the field today, those few manufacturers that offer this, they offer 2, 4 or 6 degree increase of the dead band.

So, one thing, you know, I'm open to discussion and debate is the exact verbiage of this code, and also the exact degree amount. But the main point is that this measure could be implemented at a very low cost, no new infrastructure, effective for manual or automatic sheds. So I'd like to continue the process and the discussion and get this into code before any more zone controllers go out there that are not enabled with this feature.

Thank you.

MS. HEBERT: Questions, comments?

COMMISSIONER ROSENFELD: Go ahead, Mazi.

MR. SHIRAKH: Dave, have you presented this concept to EMS vendors? Are they okay with this? Are they willing to reprogram their

software?

MR. WATSON: I can tell you two comments. I talked to one EMCS vendor who does offer this feature already. And I've not talked to them about the code aspect of it. This is several years ago.

They put it in just because it made sense. It was kind of an engineer's idea to put it in, but I don't think it ever made it into the marketing material. So it's in there, it works great, but no one really even knows about it.

But I think more relevant to your question is in our automated demand response tests one of the facility managers for Oracle actually required this feature, global temperature adjustment, to be added to his sites for a given vendor to get more business from him. And they added it to their standard product line.

So, with that, which is a little nudge, one vendor -- well, put it this way, with just an engineer having a good idea, was able to throw this feature in at one company. At another company, with just a little nudge from one customer, they added it at no significant cost.

MR. SHIRAKH: So, if we did add this

provision to the standards, we can be fairly confident that products would be available when the standards go into effect?

MR. WATSON: Well, you all have more experience with the Title 24 process than I do, but my understanding is that vendors are made aware of upcoming standards, and would have, you know, some time to add this to their normal bug fix and feature ad schedule.

So, as long as they know about it I think that it is realistic to assume that they would just add it for the California market. And it would not be a special California product. It could be sold nationwide. And does not add cost and does not detract from their standard product line.

COMMISSIONER ROSENFELD: Dave, I'd like to make a comment. Your talk was extremely interesting to me just because I'm aghast, I guess, at the fact that this isn't required everywhere. And Charles Eley asked about are we, in the case of the PCTs, putting in the PCTs before the demand response system is available.

In this case it's just the opposite. I don't know why the hell we didn't discuss this.

Where were you when the 2005 standards were being discussed?

The point I want to make is starting with the energy crisis every building in this state, 50,000 meters were put on time-of-use pricing. That's not demand response, it's every afternoon in the summer.

I would think that lots of building operators would like to set their thermostat up at noon when time-of-use prices come in, maybe only by two degrees, but nevertheless they should have that availability because the prices do double.

And there must be millions of buildings in the United States that are on time-of-use pricing. So I think, you know, we're not ahead of the game in this particular case. We're three years behind.

MR. WATSON: Yeah, I would agree. And I would comment that I think building operators would like this, but generally they're not part of the design process I've found.

And having come from, you know, from actually programming these things, myself, through design and research, and kind of seeing all angles of the picture, is the way to have the insight to

get it into code.

I think -- put it this way, customers are not generally banging on the door of these companies asking for this feature. And even the companies that have it, it's not prevalent in their marketing literature. So there's not a huge financial driver I think is the only reason.

But more and more sites are getting those huge demand charges. So I think if anything, giving the operators the ability to cut that demand and enable demand response, that should get somebody's attention.

MR. ELEY: Could you back up one slide, please. It says in facilities with multiple space conditioning zones, each controlled by an individual thermostat.

This would include systems other than those that have energy management systems, as I see it. Is that your intent here?

I mean, for instance, if there's a packaged variable air volume system on the roof that serves ten zones, and that package system, it wouldn't necessarily have an energy management system. It could have some separate way of controlling temperature in each zone.

I guess where I'm getting is are we requiring EMS systems for multi-zone systems --

MR. WATSON: I think I understand you comment. I attempted to adjust that. Systems with stand-alone thermostats that are not connected via EMCS are excluded. So, --

MR. ELEY: So essentially this, if you put in an EMS, then this requirement is triggered. If you don't have an EMS, then this is moot?

MR. WATSON: That's correct.

MR. ELEY: Okay, got'cha.

MR. WATSON: In other words, in commercial buildings with just a whole bunch of stand-alone thermostats, this does not apply.

MR. ELEY: Then we need a definition of an EMS --

MR. HAIAD: That's correct.

MR. ELEY: -- that needs to accompany this and go into the definition section of the standard.

MR. WATSON: Okay.

MR. ELEY: We need to be careful about how we define that.

MR. WATSON: I appreciate that comment. Matter of fact, if anyone else has similar

constructive comments, that's why I'm here today.

COMMISSIONER ROSENFELD: This is Art again. I'm just agreeing with Eley, but it seems to me that we want to make it easier on the reader to understand that you either have a PCT, which we've discussed ad nauseam, or you have an EMCS.

MR. SHIRAKH: And I take it we're just talking about DDC systems, not pneumatic or anything. We need to, when we define it we need to make sure that we identified that.

MR. WATSON: Yes.

MR. PENNINGTON: So, a comment that I have about this is that I can see having this installed in the controller and not acted upon by the building operator. And it just sits there and we don't get any benefits from it.

So I'm sort of wondering how we verify at the enforcement point that the system is ready to go and to be used. And I'm wondering if there should be acceptance requirements for this approach.

MR. WATSON: Yes. I saw the -- it's a few sections after this in the existing code where it says acceptance criteria, and currently I think it says A through H, or something like that. And

we just add, you know, A through G, or whatever.

MR. PENNINGTON: Do you have suggestions about a protocol for how to check to make sure that there is such a system and it's operable?

MR. WATSON: Yes, it would be --

MR. PENNINGTON: That you could propose, not --

MR. WATSON: -- it would be, you know, please increase the cooling setpoint for the whole building. And let them --

MR. PENNINGTON: Okay, it would be helpful for you to think about that --

MR. WATSON: Okay, --

MR. PENNINGTON: -- and propose that.

MR. WATSON: -- that's a good -- so those are two excellent comments.

MR. ELEY: Look at appendix N-J, and there would be a new section added to that.

COMMISSIONER ROSENFELD: This same thought applies in a weaker way to the PCTs. And I'm assuming that because the PCTs and these global thermostats will be useful in emergencies, that the utilities will, in fact, have a program of running a test two or three times a year -- two or three times a summer, in fact, more likely.

And we might want to discuss something about reliability or dependence on that, even for the PCTs.

MR. PENNINGTON: It seems like the utilities are already concerned about the PCTs and making sure that they're working --

COMMISSIONER ROSENFELD: Yeah, --

MR. PENNINGTON: -- properly, related to their DR program. And this idea would enable a whole bunch of other buildings that weren't necessarily in a program to, you know, participate in some way.

COMMISSIONER ROSENFELD: Right, they're already in that program, yeah.

MR. PENNINGTON: And so I'm not sure if the utilities would be, you know, actively making sure that these devices are working. I think for PCTs it's probably covered or, you know, maybe we don't have to worry about it very much.

Whereas with these maybe we do --

COMMISSIONER ROSENFELD: Although I will make the point that these buildings, these large buildings that already have time-of-use rates represent 30 percent of all state load. So it's something the utilities are not going to forget

about in a hurry. But we can ask Carlos about that later.

MR. HAIAD: Later, I guess, is now.

(Laughter.)

MR. HAIAD: Carlos Haiad, Southern California Edison. A couple of quick comments. They are, as David pointed out, there are already manufacturers with this strategy implemented into their product today. He mentioned two, but I think there is at least three out there. So, in that regard you wouldn't be out in the left field. They are offered today.

A little caveat though is that in large commercial buildings that is not owner occupied, there is a lease agreement barrier that says you shall provide me with some cooling and some light level. And they may not be able to deviate that much without breaking the lease. It's a business issue in there. Just a heads up on the opportunity that is out there.

I would like to have more work that would allow me to have connectivity to that EMS to enforce or to verify that, in fact, the strategy is in place, wasn't reprogrammed to be eliminated, for whatever reason. And, in fact, as it is with

a PCT, there is an external communication that would trigger that.

Involves what Dave was trying to avoid, which is some communication for a structure which adds cost to all this. But may help on the issue of, you know, is it commissioned properly; is it doing what it's supposed to do. And is it keeping doing what it's supposed to do. Would try, you know, twice during the summer to just send a signal and see if the building responds or not.

In fact, they are proposing that work to us today. So, we'll see how that plays out.

But you are right in the sense that it is, you know, today for reliability the system is not complete. I need to send a signal to a person that will then trigger that. And for reliability that's, you know, having the middleman in there is a no-no. Somehow, we, the utility, would have to have, under a prearranged agreement, have access to that offset, in this case the EMF.

But, anyway, I don't have an answer here how we get the connectivity to the EMS. It shouldn't be a tremendous leap of technology, but it's not what is being proposed here.

MR. WATSON: I'd like to respond to

Carlos' comments. The first one is very good. On tenant leased offices, you know, we've talked to many building owners in our research that say, we would love to join your program, but some of our tenants want to break their lease. If they have the slightest chance to do so, they will. And, you know, if prices have gone down or things like that.

They said, suggested if there were some lease language that said if the state issues an alert of, you know, type X, then we're allowed to deviate from our standard lease by three degrees or whatever.

If there were an official state category, sort of like hurricane categories, for example, you know, if you want to break a vacation rental, sometimes they'll say, you know, you have to pay not matter what weather, unless it's a hurricane of a certain category, as defined by a certain agency.

Sort of like if something like that could be written into lease language. And if there were a state-issued category of demand response event, that might be an example of something that could help the situation that

Carlos mentioned during those few times.

In addition, his comment about connecting this GTA to some remote signal, I'm in favor of that, as well. I think what I'm suggesting is that this global temperature adjustment initiative go ahead separately and in parallel to any kind of remote signals that are also being developed.

But if they both succeed as envisioned in 2008 then they'll match up very nicely. But this one is, to me, such an obvious and noncontroversial slam-dunk that like Art said, should have been done years ago.

I suggest keeping it clean and separate from all the confusing technically and policy-wise issues associated with new remote signals. But, yet, if a new remote signal does become available, this measure should be compatible with it and take advantage of it in the future.

MR. GATES: Steve Gates with Hirsch and Associates. Just to reinforce a little bit what Carlos said, I would like to point out that there are a lot of intermediate sized buildings that may have an EMS but do not have a full-time operator. So the concept that you simply have this as a --

that you initiate it via email or some other communication, and then an operator is then standing by so that at 1:30 in the afternoon he can hit the button, is not the case.

So I really do -- I would like to emphasize that. It's something that's going to go into the standards to this effect that there also be a means provided for an automatic communication with the utility.

MR. SHIRAKH: I think Dave's point is that this is a minimum cost, doesn't add anything additional to the cost of the operating the building or getting the EMS system in the first place.

So, I mean, all these other issues that you're bringing up is an additional thing. But it shouldn't preclude us from requiring this into the standards because it's such an obvious benefit.

MR. MAEDA: Bruce Maeda, Energy Commission Staff. Do, typically the software have capability of exceptional zones where a process may be going on, or things of that nature, where you might need tight temperature control or tight humidity control, and therefore you can have exceptions?

MR. WATSON: You're asking the question?
MR. MAEDA: Yes.
MR. WATSON: Yes. Even in the examples that I mentioned like Oracle and Cisco that have this feature, it was not enabled in their server rooms, for example. So, yeah, that's a standard feature to be able to pick and choose which zones, listen to the signal and which zones ignore it.
MS. HEBERT: Any further discussion? Seeing none, thank you very much, David.
MR. WATSON: All right, thank you.
MS. HEBERT: We are running a little bit late and what I'm going to suggest is that we get some public comments in now, and go until 12:30 instead of 12:20. And I'd like folks who can't stay for the afternoon public input session to come to the microphone now.
And Mike Gabel has already let me know that he can't stay, so I'm going to invite Mike up first.
MR. GABEL: Actually, Bill's going to speak --
MS. HEBERT: Oh, Bill Mattinson's going to speak instead.
MR. MATTINSON: Thank you. I'm Bill

Mattinson with CABEC, the California Association of Building Energy Consultants. With me today is Mike Gabel. He and I sort of share the responsibility of representing our organization and participating in these processes. Me on the residential side; Mike on the nonresidential side.

Also with me is Gary Farber, who's been extremely active in monitoring, advising, suggesting and nagging the Commission a little bit, a great good benefit, I think.

I want to talk on a little different level than what we've been hearing this morning. And the stuff we've had this morning about the controls and where we're going with that I think is very very exciting, and it's going to be a huge benefit.

But, I want to kind of get back on the ground a little bit. And as I've said over and over here, CABEC, our interest here at the Commission is that we jointly develop standards that are technically correct. And I think that's a big part of what's been going on here. That they're fair and that they're enforceable.

The Commission's put a great effort, and continues to put a lot of effort into the

technical details, whether it's implementing new technologies or implementing new methodologies in analyzing the performance of buildings. That's been terrific. I think there's been a real strong effort towards equity, towards all the players and stakeholders involved.

I think there has been a gap on the enforcement and implementation issue which is critical if this is going to be meaningful.

I do think in the standards development process, as we're in now, our first priority should be to stop and evaluate the most recent standards that we've implemented, and ask a few questions. What's working, what's not working. And ask them of the people who are in touch with the builders, the enforcement officials at the building departments, and the consultants who are working to interpret the rules, put them into calculations and documentation, and get them into specifications and drawings that can be built and enforced.

That appears to be lacking. I noticed in the, oh, I don't know if it was called the work plan or whatever, there was this alphabetical list of things on the table for this time. Item I was

to do that; to look at the items. And yet I wasn't here so I may have missed it, but in the presentations that I saw online that Charles Eley did of the tasks for '08 that didn't appear anywhere that I could identify.

So, I don't know if it's been dropped, hidden, moved or I just missed it. But --

UNIDENTIFIED SPEAKER: We'll be raising it, too.

MR. MATTINSON: Yeah. I would expect so. One thing that -- so I think we need to back-check on what we've been doing before we move on to something else. The assumption that everything's working fine paints a rosy picture, but isn't necessarily true.

And I think when it comes to the real counting of how much energy we've been saving, if such an accounting does occur, we're going to see some deficits there that could be surprising; it could be disturbing.

One thing that relates to that, and I do very much appreciate this relatively long process of developing new standards. Years ago when I'd stand here I'd say things like, gosh, you pulled the rabbit out of the hat and now you're loading

on it, and we haven't had a chance to even digest, you know, how it's been cooked.

It's nice that we have this several-year process, but the difficulty that I've had, and I think others have had this, too, is that last fall when you really opened up comment, you know, make your proposals of what you want us to look at, those of us who are closest to the implementation of the standards were totally absorbed in the standards that rolled out on October 1st.

We were either training people, our people, other people, on what the standards meant. We were coming to terms with software that had been released sometimes days or weeks before, as to how to run it. We were finding areas in the code and in the software and in the documentation that hadn't been foreseen as we ran those things.

We were working with building departments who were overwhelmed with coming to grips with this. And yet it was the time we were supposed to be marching up here with our new ideas.

I don't know how you can change the calendar, stretch September out to last about three months or something like that, but it made

it really difficult for many of us to show up when we would have been hurt perhaps more.

And that's why I guess I'm apologizing for being late to the table here. But that would be important. The consultants, the builders, the designers, the enforcement jurisdictions can't handle that many things at one time.

Getting down to the enforcement and implementation, just one example from my personal experience. Last year in 2005 I presented about 100 training sessions throughout the state for a program, the nonresidential fenestration certification initiative, which was aimed at bringing an explanation and understanding and some direction to the nonresidential community.

The designers; we met with a lot of architects and engineers, mechanical engineers; we met with building departments; we met with many many glazing contractors to try and get them to understand what was expected of them currently in the standards that had been in place since 2001, really. And then what to look forward to on October 1st of last year.

The ignorance of what had been in place for four or five years was stunning. For example,

and I think we all agree that windows play a big role in any building's energy profile and energy use. That's why we've worked so hard with NFRC to get a handle on what's real.

The standards for commercial buildings have required since 2001 that two simple values be shown on the drawings, and that they match up with the values used in the calculations. And they're the most basic, the U factor and the solar heat gain coefficient.

Almost without exception nobody ever put those things on their drawings. I rarely have seen it in reviewing and doing compliance documentation for hundreds, hundreds of buildings, ever seen that.

Only one building department that I came across in the entire area that I trained, which was really all of California, was asking for it on a regular basis. So there were a few architects in the San Diego area that said, yeah, they make us do that. No one else had ever been asked for it.

And yet the number one complaint of the glazing contractors was that they couldn't find out what they were supposed to put in. They

didn't know what they were required to put in. Either they didn't get a copy of the Title 24 report, or the relevant Title 24 pages that were supposed to be printed on the drawings weren't in the sheets that they got.

And since the rules say that the SHGC and U factor should either be on the floor plan or the window schedule, they would have gotten it had the rules been implemented. But they didn't.

So consequently they didn't know what they were supposed to put in. And the competitive nature of their business forced them to sort of downgrade to what they thought they might want. The specs didn't match, the architectural specs, looked like something out of 1985, glazing shall be quarter-inch green. End of spec. No U factor, no SHGC, no nothing.

That's an example of a real disconnect there. And the results are buildings that probably don't comply and very likely use a lot more energy than we expected them to. And that's just one thing.

So the architects didn't know what to do. They weren't doing their job. The building officials weren't doing their job. It's lack of

information; it's lack of training. It's some sort of missing oversight. Across the board, really.

And now we've got new standards and new methodologies. We're looking into new ways of modeling the performance of fenestration products, moving away from some of the things we've done, which is all great. The technical accuracy of the calculations is as important to me as to anybody else. It's a big part of how I make my living is looking at those things and making sense out of them and generating the correct values. But we need to make sure that it's getting to the streets.

Not to end on a negative note here, on the positive side there's been some great stuff. In my region, I live in Sonoma County, the recent requirement for HVAC changeout systems, that you get new air conditioners, new furnaces or new components installed, requiring those duct systems to be tested has flamed a revolution in the HVAC industry locally.

In my area, unlike the Sacramento Valley and parts of southern California, duct testing has not been a regular part of the new construction

regime. The balance between the standards and the climate haven't required it for compliance in most cases. People have been able to use other options.

So there wasn't a lot of experience with this. But this HVAC changeout rule has forced contractors who never thought about it to totally rethink the way they're doing business. We've gone out and tested ducts and blown smoke through the -- well, through the house. We put it in the ducts, but it ended up throughout the house.

(Laughter.)

MR. PENNINGTON: Right.

MR. MATTINSON: And showed contractors that they aren't doing what they thought they were doing. And many of them have said, I'm going back to the shop and we're starting at ground zero on how we're going to put these systems together.

That's been tremendous. It's been a benefit and it's working. One of the big questions when we talked about that before the standards went in was, well, are people just going to sidestep it and not get a permit. Well, I'm telling you that I think more and more people are getting permits. Nobody wants to take on the

liability of another broken rule along the way.

And we're getting the better contractors paying attention and bringing, bootstrapping the whole thing up to a level of compliance that's exciting. And I'm really pleased about that.

But in general, and Mike's got more to say, and Gary's got a little more to say, and I know we're approaching lunch, so I'm going to stop.

I just think that -- and we wrote something to the Commission Staff and the Commissioners asking for a percentage of the budget to go towards this. And I just hope that you would consider it and try to find a way to get the people who are closest to the ground involved in both development of new standards and assessment of existing ones.

Thanks.

MR. PENNINGTON: Just a reaction, --

MR. MATTINSON: Yes.

MR. PENNINGTON: -- Bill, for a second. One of the things that naturally happens during an update cycle on standards is that you have to focus on the analytical issues first because there's a lot of time that's required to do cost

effectiveness analysis, redo models, you know, get algorithms installed in models, get your tools in shape, you know. There's a whole bunch of front-end work that has to happen for substantial changes that increase the stringency of the standards.

And so I think that's what you've been seeing is that we've been working hard on a variety of those things.

We will have a period during the proceeding where we will be looking at what kinds of improvements should we make to the standards language, itself, to address clarification issues or implementation-related issues.

And that is part of our plan, you know. Maybe it's unsaid in the plan, but you can't get there without doing that. And it's been our experience that we work actively with CABEC on the issues that CABEC raises, as we do with other parties during that timeframe.

So, it would have probably been useful if you could have been present at the first set of workshops. And, you know, we probably could have started the dialogue a little earlier. But on the other hand, we have time to deal with your

comments, and that will be part of the project.

MR. MATTINSON: Good. So I'm not too late to the party, then?

MR. PENNINGTON: No.

MR. MATTINSON: And just responding to that, if that placeholder is a little more obvious, that we are going to be looking at that, and it gets on the calendar or on the workplan, then all of our comfort levels I think would be better. Thanks.

MR. ELEY: This is Charles Eley. I agree with Bill, and I'm especially interested in hearing what's working and what compliance authors are having trouble with, and what builders are having trouble with, and what building departments are having trouble with, and manufacturers.

And maybe we should make it clear during the open-mike part of these hearings that we'll accept comments on that.

This is the first phase, as you know, where we're kind of analyzing specific measures. This next phase is to draft the actual changes to the standards and the ACM manuals. And there will be an opportunity there to correct problems, I think, if we know what they are.

MR. MATTINSON: Okay.

MR. ELEY: And then the next phase after that is -- are the compliance manuals and the forms. So you've got another opportunity there, provided we haven't closed the door, you know, during the standards and ACM process.

MR. MATTINSON: Yeah, that leads to one thing, and I don't know if Mike was intending to talk to that, either, but we get the manuals, we get the approved software, and then we start using it and find out the gaps and the holes.

And sometimes the process seems like we got to wait three more years before we change a lot of those things because of the way the law is. And, you know, I don't know where we can move there, but if we could find some more wiggle room to fix things as they come up, that would be helpful.

MR. ELEY: Right. Well, this process actually started before the '05 standards were implemented.

MR. MATTINSON: Right.

MR. ELEY: So, I mean, that's the timing that we're kind of stuck with here --

MR. MATTINSON: Yeah.

MR. ELEY: -- with the process, so --
MR. MATTINSON: I appreciate that.
MR. RAZAVI: -- it's unfortunate, but that's the reality.
MR. SHIRAKH: That's good news about the changeouts.
MR. MATTINSON: Yeah.
MR. SHIRAKH: I remember last summer when I was going to the training classes and the subject came up, sometimes I had the urge to hide under the desks. But, that's good news.
MR. MATTINSON: I think it's been very powerful.
MR. SHIRAKH: May I ask how many people want to talk on this topic? So I see --
MS. HEBERT: And how many of you cannot stay till 4:00? All right, so --
MR. SHIRAKH: So, why don't we ask Bob to come up and then Gary.
MR. RAYMER: Bob Raymer with the California Building Industry Association. And amazingly I find myself saying ditto to the previous speaker 100 percent.
Our number one issue right now for the upcoming standards is to focus on implementation,

education and enforcement of the existing standards. And we are seeing some problems.

For the Commissioner's benefit, we saw a big problem after the myriad of changes back in the late '80s and early '90s. We did a pretty intensive review on how things were going out in the field in the mid '90s. And we found that implementation and enforcement wasn't nearly where it needed to be.

And so we started a very ongoing and very detailed focused effort on improving that. And it turned out to be a very productive effort. And we maintained that for some time.

Unfortunately, our educational efforts have started to drop significantly over the last year. I'm not quite sure why. Perhaps the PUC and some of the utilities are maybe refocusing efforts. We're all kind of spread thin. But our effort, our educational effort has dropped.

And for Charles' benefit, I can tell you that right now we're having some problems, both in terms of design and application, as well as enforcement in new construction in the areas of lighting and the several areas where you would utilize third-party inspections.

There's a lot of question, technical questions around those areas, as well as are you taking credit for it and not actually doing it to the extent it's supposed to be done or at all. There's a lot of questions that have to get resolved.

The problem here is when you had an AB-970 emergency standard and a 2005 update, both of those were big updates. I mean they were probably about three times -- each of them was probably about three times as large of a grab at consumption as we normally see in previous updates.

And so you put those together, we got way out there within a three-year period. And we're now kind of seeing the effects. There's a lot of great benefits that can come to that, but they don't really occur until we get down to where the rubber meets the road.

And right now, yeah, there is a kind of a statewide problem. We need to focus on that. And that gets to my second and final point. I know that Bill's aware of this; he attends our construction codes and energy committee meetings, but probably a lot of other people in the audience

may not be aware of this.

After using the Uniform Building Code in California for the last 40 years, we're finally going to be making our switch into the new International Building Code that the rest of the country has gone to. We're also making the switch into a new fire code for most commercial occupancies.

In addition, the Building Standards Commission and all the state agencies and, of course, the building officials and us, will also be participating in the incredibly detailed updating of the plumbing and mechanical codes.

And so effectively, the entire face of California's building code structure is going to dramatically change. And a whole lot of your stakeholders that you would normally like to see at processes like this, for example this week there's two other meetings going on right now that I would like to be at in southern California on that very issue. I was at one yesterday and I'll be at one tomorrow here in Sacramento.

And so, you've got building officials, other regulators attending these. And we've got a bit of a logjam that's going to be occurring in

2008, the end of 2007, throughout all of 2008 and the beginning of 2009. And that is the new IBC with California amendments, IFC and the 2006 UPC and UMC are all going to be taking effect either in the late 2007 or early 2008.

There's going to be a tremendous effort on the part of local government to train the building officials and subcontractors on the myriad of different changes and where you can find this stuff.

Fortunately, they're formatted very similar, but there are lot of new provisions. And since these relate to structural and fire safety, that's where they're going to put their big, you know, goals at.

So, to the extent that we can kind of get on the bandwagon now, and the education and implementation wagon, is really going to help, because that can help smooth things out as we approach this period where everybody is going to be spread very thin for at least two years, if not longer.

And that concludes my comments.

COMMISSIONER ROSENFELD: Just a factual question, Bob. You said your implementation and

enforcement activities are decreasing. Why? Is that funding is decreasing --

MR. RAYMER: Yes, precisely.

COMMISSIONER ROSENFELD: Funding is decreasing. It came mainly from the public goods charges?

MR. RAYMER: We had a number of fund sources for builder energy training program. But, yes, they've pretty much been, over the last two years, slashed to about 20 percent of what they used to be.

Now, I'm sure that's going to change. We're going to do what we can to change that. But we were training a lot of our site superintendents and the people right under them, as well as some building officials. And we were basically hitting right where the training needed to occur.

And as that drops off we're seeing a rather dramatic impact from that. So to the extent that we can get that back up and rolling, we could use all the help we can.

COMMISSIONER ROSENFELD: I'll try.

MR. RAYMER: Thank you very much.

MR. GABEL: Mike Gabel from CABEC. Just a couple more minutes to add in some things that

Bill didn't quite get to.

I think all of us in the industry have felt like we swallowed a whale on October 1st. And it's just taken us several months to really begin to digest it and figure out what to do about it.

I think the feeling is, among CABEC and a lot of other people, and sounds like Bob, as well, is that rather than the fixing problems being kind of a footnote to the process, that it really be acknowledged as one of the central components of the process.

And then it's perhaps even relevant to consider a workshop specifically to address problems with current standards that need to be addressed in the new standards. And I hope it's not too late; it sounds like it isn't too late. So that's constructive.

Also, just from a funding point of view, in other words staff is overworked, and everyone's on their mission to do what they have to do, but to somehow find a way to have some peer review, maybe paid peer review, not just CABEC members, but others, as well, to try to troubleshoot problems.

On the enforcement side, the Commission used to do a lot of monitoring of building departments where they used the carrot of training rather than the stick of humiliating departments with doing a poor job.

I think ongoing training to building officials should be a really major component of the financial budget of the Commission. And CABEC is going to try to flesh out some other ideas that we think are useful, something like a simple plan check and inspection guide that we think is long overdue, that we think will help training.

And finally, we would like to just mention in passing the fact that the standards now, the standards, the residential, nonresidential manual, the joint appendices for the appliance standards are about 1500 pages total now.

In the hands of people who know how to apply the standards well, they are really effective. I think they are. But the issue for us is for the Commission to reconsider the possibility of certification of people who perform the analysis and/or people who are involved in the plan check. Because it seems to me it would be

very useful to at least reopen that dialogue.

So, to sum up, I think CABEC would like to reopen an intense and serious dialogue just to start it off today. But over the next couple of months and even probably couple of years, to address these issues.

Thanks.

MR. PENNINGTON: So, Mike, just one reaction. I hope CABEC understands that the Commission does not have the authority to require certification of energy consultants.

MR. GABEL: We understand that, right.

MR. PENNINGTON: Okay. So, --

MR. GABEL: But if we were going to --

MR. PENNINGTON: -- if we want to make some progress on that it's going to need to be a legislative solution.

MR. GABEL: I think we're aware of that, right. But we'd like to have you participate in discussions if we're going to engage that process possibly.

MR. PENNINGTON: Okay.

COMMISSIONER ROSENFELD: I'd like to get on this bandwagon, if for no other reason than not to get run over by it.

(Laughter.)

COMMISSIONER ROSENFELD: And this is partly to Bill Pennington, partly to Mike. There really is a huge discrepancy here.

The utilities spend a lot of money on their public goods programs, doing monitoring and verification. In fact, 7 percent of the whole budget goes to monitoring and verification. And 7 percent of $500 million a year is $35 million a year goes to monitoring and verification.

Now, the building standards contribute about equally to all of that public goods charge in terms of saving kilowatt hours and kilowatts. And the utilities, somehow or other we've not got public goods charge monitoring and verification concepts into our side of the story.

And I think there's a huge discrepancy here, and I will try to make some noise about it. But I thank you guys for bringing it up.

MR. GABEL: Yeah, thanks. I mean this is -- we just think it's the start of a long journey, but we'd like to at least start.

MR. PENNINGTON: We are coming up to a potential big change related to that. In this last process of planning for the 2006 to 2008 PGC-

funded energy efficiency programs --

COMMISSIONER ROSENFELD: And you know because you're on the advisory committee.

MR. PENNINGTON: Yeah, I've been involved a little bit. There was a big change to have the savings relative to what standards accomplish to be viewed as a resource rather than -- a resource program accomplishment rather than an information sort of overhead kind of activity.

And that is moving up the bar, if you will, on the need to have verification related to that. And so the PUC is working, as we speak, on protocols for how to have verification activities related to what is accomplished through the codes and standards program.

So that -- I mean Mike Messenger is working on it right now, you know, as we speak. So that's coming. And there's people in the audience that could speak to that if you wanted to hear more about that.

COMMISSIONER ROSENFELD: Well, no, I think Bill and I have showed sympathy.

MR. PENNINGTON: Yeah, that's true.

UNIDENTIFIED SPEAKER: Thank you.

MR. RAYMER: May I just make one more -- excuse me. As Bill Pennington pointed out, the Commission doesn't have the power to bless me with a license or a certificate or anything like that to do the work that I do. But I do understand that at least one state senator has talked to you recently about that, Bill, is that correct? Or his Aide, and that there may --

MR. PENNINGTON: Yeah.

MR. RAYMER: -- be some opening towards moving in that direction?

MR. PENNINGTON: I'm aware of one legislator that's interested in that.

MR. RAYMER: Maybe we could talk about that with them. Thank you.

MS. HEBERT: I would also like to add that we have started a collaborative effort between building officials, the IOUs and the Energy Commission to increase the education of the building departments. And I'm involved in that and will be carrying forward with that.

CALBO, the building officials statewide group, has appointed two people to be representatives on the energy issues, and they are very proactive and we're working with them. So,

just so you know that.

And so I'm going to have Gary Farber come up next. And before Gary speaks, I just want to offer him an apology. He's submitted comments to us. He's been very proactive about submitting comments to help us refine and clean up the standards. And he sent some comments before I had a place on our website to put them. And now that we do have a place to put them, it fell through the crack, so I apologize and we'll get your comments up on the web. Thank you, Gary. Take it away.

MR. FARBER: Appreciate that, Elaine. Gary Farber, member of the CABEC Standards Committee for many years, and go way back to when the standards were in draft form back in '77, working professionally with energy codes. So little bit of experience.

And I've submitted about 17 pages worth of ideas for the '08 standards and fixing issues.

MR. PENNINGTON: We thought we were missing some of the pages.

(Laughter.)

MR. FARBER: I could re-send them again, if you like. Anyway, Bill and Mike stole some of

my thunder, but I've been through many many code cycle changes. And I have to say, just to be very honest, I haven't been through a code cycle change that has been in as much disarray, probably the most honest way to put it, as this one in terms of some of the problems with the code language.

Mainly with problems with the manuals being clear, ACM programs working properly; forms being clear in terms of what is intended; what building inspectors need to look for; what builders need to install. Just a host of problems.

And most of -- I believe that most of us energy consultants were just incredibly busy, as has been pointed out already, in trying to digest all of this,when, you know, your sessions started on figuring out what you wanted to do in '08. And unfortunately it wasn't possible for us to attend the previous workshop. I don't know if there's a way to, you know, do a four-year cycle instead of three, or take on less work.

But somehow I believe this timeline isn't working well because I know because I've had issues before staff since before October that still haven't been responded to. That staff is

too busy dealing with '08, and too busy doing training to deal with issues that come up due to the code change.

And I think we need to give ourselves at least three months just to deal with code change issues the next time we have a code change in the future, you know, before we jump in full speed on the next code cycle. So, I think that would be really useful.

I've got, you know, comments that I've submitted in writing regarding lots of different aspects of the code, complexities, parts of it that just aren't fitting together. Equity issues, you know, for instance we've really squeezed tiny little residential additions, making it very difficult to -- especially under prescriptive.

You got 200 square foot addition; you're allowed ten square foot of west window area. And if that 200 square foot addition is facing west, you got a little bit of a problem.

I understand that staff has decided to eliminate credit for glass removed when it comes to the west glazing maximum area, and yet I haven't seen anything issued in writing but the hotlines indicating that.

I know I don't have a lot of time here, we want to get to lunch, but this is just evocative of so many issues that are going on with the code.

What I want to emphasize more than anything, though, is that when it comes to actually complying with the code and achieving the energy savings that California policymakers feel we deserve and ought to be the policy, I don't think we can rely strictly on enforcement agencies to get us there.

I mean they rightly have to emphasize life safety issues. And I think Bob and others probably agree that, you know, they've got limited time in plan check, limited time in field check, and the code is just achieved a level of complexity that I don't believe -- well, I think that the Commission needs to decide whether it can actually be effective without there being some qualifications for professionals to carry out the code.

I think, you know, I think that that ought to be part of the task, is to determine can the code be effectively implemented without there being any professional requirements for those that

are dealing with it.

And, you know, it may be that for prescriptive compliance, residential and nonresidential, yes, maybe anyone should be able to do it. But when it comes to performance based compliance, my feeling, and I believe CABEC probably is on board on this, is that for both residential and nonresidential performance based compliance that there ought to be professional requirements for those that carry out the code.

Giving the building departments some more assurance that what's been done is correct.

In my work, doing plan review for many cities over the years, I'm not doing that much now, but I have done it for many years in the past, and also for DSA for a year more recently, I have to say that I've never seen an energy report prepared by an engineering firm that was done correctly. Ever.

And I think every Title 24 report I saw prepared by an engineering firm for DSA submittal used center of glass values. Without fail.

So that's where I think we are. I don't think it's acceptable. I think building departments, they see an engineering firm's, you

know, name on a report. They say, well, they probably know what they're doing, they're mechanical engineers.

And I suspect that a lot of engineering firms give that work to their, you know, people lowest on the totem pole there to say, here, try to figure this out, put it together. And then gets the firm's name stamped on it. People think, oh, it's legitimate. The building department stamps it approved, and there you go.

So, that's what I see. I've been doing this for decades and that's -- so, anyway, I appreciate your time. We'll let everyone get to lunch. And if you have any questions I'd be happy to go over any of my particular detailed, you know, comments that I've given to you in writing. If we don't have time now you know where to find me. I'd be happy to talk to you.

MR. SHIRAKH: We have received your comments, both the previous one and the latest. And we will respond to it.

MR. FARBER: Appreciate that.

MR. SHIRAKH: I know. We'll probably final contact you and we'll go every single one of them, so.

MR. FARBER: Great; I really appreciate that. Thank you.

MR. SHIRAKH: Anybody else wants to add anything on the residential topics?

MS. HEBERT: All right, so we're going to break now for lunch. Sorry, we're going to have a little less than an hour, so thanks --

(Whereupon, at 12:36 p.m., the workshop was adjourned, to reconvene at 1:30 p.m., this same day.)

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AFTERNOON SESSION

1:35 p.m.

MS. HEBERT: Welcome back to the 2008 building energy efficiency standards workshop. We are now going to have a discussion on nonresidential site-built fenestration led by Charles Eley. Welcome, Charles.

MR. ELEY: Thank you, Elaine. First of all, I'm sort of the spokesperson, but the ideas here have emerged from some conferences with NFRC, the National Fenestration Rating Council. And really the substantive changes we're talking about are changes in the way NFRC tracks data and makes data available for simulation and code compliance purposes.

There's two proposed changes on the table here. The first one is to implement more accurate modeling procedures for shop-built or manufactured fenestration. These are products that now typically carry an NFRC label.

And the second proposed change is a more workable procedure for site-built fenestration. So both of these are separate changes, but they're related.

One of the reasons why we need better

accuracy is that the reference method in California, which is DOEII, has two modeling procedures for fenestration. I guess it's got three, but the two that we'll talk about today are the -- the first one is the U factor shading coefficient and VLT method.

And it's this modeling method that is the only one that's really recognized in the nonresidential ACMs. The reason that it's the only one recognized is because we, in California, look to NFRC ratings for fenestration products. And the only data that's available for a shop-built window or skylight is U factor, solar heat gain coefficient and visible light transmission. Those are the three data points that are provided.

All the algorithms in the nonresidential ACM manual are tied into this particular method. There is -- now, actually the DOEII method doesn't really use solar heat gain coefficient. It instead uses shading coefficient, which is something we're trying to get away from. But the ACM manual has an equation in there where you can convert the SHGC that's available from NFRC labels into a shading coefficient which can be used for code compliance purposes.

The second method that's recognized, or that's available with the reference method, which is DOEII.1(e) is one where each fenestration product uses a detailed Window5 file, or previously Window 4 file. I think the format's exactly the same; hasn't really changed that much.

These are detailed files; this is an example of one. You don't really have to look at the numbers, but it gives much more detailed performance information about the products. It accounts for the angle of incidence that the sun is striking the window, so if it's a narrow angle of incidence, or if the sun's normal to the window that makes a difference. And some fenestration products perform differently depending on that angle of incidence.

The file also takes account of wind speed which is known in the simulation, so wind speed can be accounted. The temperature of the glass can also be accounted for, as well as the intensity of solar radiation.

So, backing up a slide or two here, I think I'll go up this way, if you compare these two modeling methods in DOEII, the detailed method versus the U factor and SHGC method, the SHGC

method, or the U factor and SC method tend to under-predict the performance of windows that are single glazed, that are tinted, and that have reflective coatings. And they tend to under-estimate, or over-predicts the TDV energy for what we consider high performance glazing products, which are typically clear glass with low E coatings, maybe specularly selective coatings where the UV and ultraviolet -- infrared is blocked, but the visible light comes through.

So what this graph shows are approximately 200 fenestration products which are in the DOEII library. Now, in this analysis we excluded some of the products that are in the library. We took out all the electrochromic glazings; they're not very common. And in fact I'm not sure they're even available in the market right now.

And we took out the suspended film products. Again, it's not a very big market share. So, what you're looking at here is a variety of frame types, double-, single- and even triple-glazing with a variety of coatings.

So, down in the lower corner here, this cluster, if you look at those datapoints they tend

to be bronze and gray single-glazed products with reflective coatings. Maybe a stainless steel coating. They tend to have a very low light transmission. In fact, light transmission, for reference, is plotted here on the vertical axis. So the products at the bottom tend to have a low light transmission. And the ones at the top tend to have a high transmission. So, bringing light transmission into it begins to explain some of these differences.

Anyway, this is the problem, if you will, that we're trying to address here. And it's been raised by a number of people in this process. I don't see Jeff Hirsch here, but I know he's brought it up. And Jon McHugh's brought it up.

But this graph sort of illustrates the nature of the problem. The U factor method tends to under-predict TDV energy for reflective tinted windows, and it tends to over-predict TDV energy for what we consider high-performance products.

So, the --

UNIDENTIFIED SPEAKER: Joe had a question, do you want to answer questions --

MR. ELEY: No, go ahead and ask, if it's a clarification, yeah, sure.

MR. WONG: Just a clarification. These are percent of total building energy use or --

MR. ELEY: The scale at the bottom is the -- yeah, this is total time-dependent valued energy.

MR. WONG: For the whole building?

MR. ELEY: For the whole building. So I know Jeff Hirsch did a comparison where he looked at just loads through the window. If you looked at just loads through the window these percentages would be significantly larger.

MR. WONG: Yeah, right.

MR. ELEY: Okay. So, --

MR. SHIRAKH: Joe, can you identify yourself for the record.

MR. WONG: Oh, Joe Wong, LBNL.

MR. ELEY: That's a good point; thanks for making that, Joe. These percentages are small because there's a big constant in there. That big constant is the lighting, the plug loads, and you know, all of those things.

MR. PENNINGTON: So, Charles, it's comparing something versus something. Is it --

MR. ELEY: The two things that are being compared here are the -- these points on the

horizontal scale represent the ratio of energy consumption using the U factor method compared to what DOEII predicts with the more detailed method. Okay?

MR. PENNINGTON: So the presumption is that what DOEII predicts is correct?

MR. ELEY: That's the presumption, yeah. And there's been a fair amount of validation that shows that that's the case. That the more detailed models are, in fact, more accurate.

So, the solution that's being proposed for shop-built windows is that if you're using -- well, first of all there would be no change with the prescriptive requirements, right. Because the prescriptive requirements you got a U factor and SHGC. You compare that to the label, so there's not an issue there.

The issue here is with the performance method. So, this is the way the process would work. You would start with a set of building plans or specifications. These data would then be entered into the compliance software, which would be either ENERGYPRO or EQUEST or what's the, COMPLY or -- what's the public domain one? Whatever it is.

MR. PENNINGTON: COMPLY24, I think.

MR. ELEY: COMPLY24, yeah. And that input file would contain the NFRC CPD number, which is certified product directory number.

The simulation software would be online, and the NFRC website would be active when the simulation is made.

So when you push the button, say calculate energy use, the software would go off to the NFRC website; and the NFRC website would maintain those detailed Window5 files for everything in their product directory, which is a large number, 100,000 I think or so, items.

And it would hand back to the software the detailed data that's needed for the simulation. The simulation would move forward. the compliance reports would be produced if compliance is achieved. Of course, if compliance is not achieved, the software doesn't produce the reports. And you move on to the building permit application.

So that's the process. So the key thing here is that NFRC would make some pretty significant changes to the website. To first of all, keep this information. These Window5 files,

by the way, are generated already but they're just not kept. Maybe some simulation labs keep them, but NFRC doesn't get them back. That's the thing.

So there would be a number of changes here. The software that the Window5 program would probably be upgraded, so right now that program, I think, automatically sends information back to NFRC. And that software would be modified so that it sends back the detailed file as well as the U factor SHGC and VLT.

Now, this is another look at the process. You can look at it this way, you know. The architect begins, he selects the shop-built fenestration. The CPD number goes into the software. The detailed fenestration data gets handed back from the website. And it's this table that's shown in the measure evaluation report. But essentially it's the same process as shown in this flow chart.

Some people like flow charts; some people like tables, so we showed it both ways.

So that's how the process would work for manufactured fenestration.

The big change here is the way NFRC would manage the data, and also there's a

significant change, which is pretty important, and I think there's a lot of other implications that if the software, if the compliance software is web-enabled at the time the simulations are run, there's maybe an opportunity to bring in other kinds of data, as well. Like photometric data from luminaires, or skylights and other kinds of things. So this is the change.

Now, moving on to site-built fenestration, California requires NFRC label certificates for projects that have more than 10,000 square feet of site-built fenestration.

And by site-built fenestration we're mainly talking about curtain walls on larger buildings. Or airport terminals. Or, you know, whatever the application is, where there would be -- where the fenestration is not built in a factory and then installed in a hole in the building envelope, but rather the fenestration comes to the job site. The frames come separately from the glazing, and the glazing contractor puts it all together at the job site. So, it's a completely different product.

Since 2001 we've had this requirement for label certificates. And it has not been

widely used. Prior to 2005 you were allowed to use an SHGC that was pretty close to what would probably come from the label certificate process. So the only penalty prior to 2005 was you had to use the default U factor.

But starting with 2005 you now have to use both the default U factor and the default SHGC. So the problem is different. And some would say worse.

The default values don't really distinguish between high performance glazing products or low performing products. They're the same; pretty much low performing data is required to be used in all instances.

So some engineers and architects have reported to me that there's no incentive anymore for them to use high performance products. One engineer said, well, I used to be able to go to the architect and say, well, in order to comply we need to pick out a window with a low SHGC. And now you're stuck with the low performing numbers no matter what you pick, so there's less of an incentive.

The labels certificate process has not been widely used in California. There has been, I

think, only about a dozen label certificates issued since 2001, which is not a lot considering that we build 160 million square feet a year of nonres buildings. Not all of those would have curtain laws, of course, but it's still a fairly low use rate.

Just understanding the industry a little bit that we're dealing with, there's a number of players on the supply side. There are the primary glass manufacturers, and I believe there's just five companies that actually make glass, is that right?

UNIDENTIFIED SPEAKER: In the U.S.

MR. ELEY: In the U.S. It's a very capital intensive process to build a float line. You need a market. So there are too many, Bilkington, you know, PPG and Cardinal. Cardinal has a float line, I guess. And AFG.

And then there are the coaters. The coaters are companies like VeriCon, that they don't actually make the glass. They buy the glass from one of the primary glass manufacturers. But they add the low E coating. Or they add the reflective coating. This capital investment is a lot less. And there are more of them; there's

maybe 15 or so coaters, I think, in the U.S. Some round numbers, 10, 15 something like that.

And then there are fabricators. The fabricators will then take the glass from the coater or the primary glass manufacturer and they'll assemble an insulating glass unit, or an IG unit.

And there are some primary glass manufacturers that are also coaters and fabricators. And there's some coaters that are also fabricators. In fact, I guess all of the coaters are also fabricators.

And then there's the specialty equipment suppliers. These are the guys that make the spacers and other specialty products. There's the framing suppliers, companies like ConAir that make the extruded metal pieces that hold it all together at the job site.

There are the glazing contractors. In California these carry I think it's a C-17, is that right, Marshall, license. And then there are window manufacturers, you know, like Blomberg and Andersen and Milguard and all of those guys.

So these are the -- as you kind of move down through this there are a lot of window

manufacturers compared to primary glass manufacturers. There's only five of those. There's only 10 or 15 coaters. A lot of fabricators. And a fair number of glazing contractors.

So we're dealing with an industry that's well organized, but it is fragmented. And we're trying to come up with a process here that works in that regard.

So the modified -- the existing NFRC label certificate actually requires that in some cases that the glazing contractor actually has to mock up a piece of the window and send it to a laboratory for testing. That's one of the reasons that it's not been widely used.

Or if a particular assembly has already been tested, you can use that data to get a label certification in your own application.

The revised process that's on the table here would mean that label certificates are issued for components. And the three components that have been identified are the glass, itself, including its coating. The frames and the spacers that separate the glass in the IG units. And performance data would be collected by NFRC and

maintained at the NFRC website in their certified products directory for each of these three components.

So you could go and you could get detailed data for different frames or spacers or glass.

The frame data would be generated with a program called Frame, which is a two-dimensional heat-transfer program that simulation labs are already using that.

The glass data is pretty much already available, and I don't think there's any change proposed in how that would be managed, except it would be on the NFRC website.

And the spacer data would probably also be generated with Frame, I'm assuming. Or Therm or one of those programs.

So, the way this would work then is that NFRC would develop and maintain software which would combine any combination of frame, glass and spacer into a site-built fenestration assembly. And then a label certificate could be issued for that combination of products.

So, it would no longer be necessary to test or to do specific mock-ups of site-built

fenestration systems. Rather you could just choose the CPD number for the glass or glasses that you would want, the frames and the spacers. And the software would put them all together and create the label certificate.

The process would work like this. You would again start with your building plans. For the performance approach you would specify not just one CPD number, but three CPD numbers for each site-built fenestration; specify one for the frame, the glass and the spacer.

When you do the simulation the software would go off to the NFRC website. It would address this software that's there. It would combine the things. It would give you back the detailed DOEII, or Window5 file for that combination of spacer, glass and frame.

The simulation would proceed. And if compliance is positive or successful, the reports would be generated. You could move on to the building department.

So, it's a similar process to what we were talking about with shop-built windows. And there's an additional element. That additional element is the software at NFRC that would combine

the component label certificates into a label certificate for the assembly.

I guess there's some question about whether this software has to be at NFRC or whether it could actually be a part of the compliance software that we certify through the ACM. I think that's open for debate, it could go either way on that.

For using the prescriptive process it would be very similar except there would typically be no software. Instead the compliance author would choose a spacer, a glass and a frame, and would visit the NFRC website; get back a design label of certificate. That design label certificate would give you the U factor, SHG and VLT for that assembly. That data would be entered on the compliance forms and you'd move on to the building permit application stage.

It would be a similar process, except it would be the software would not be automatically addressing the NFRC website, but rather the compliance author would go there and specifically look at it.

This is another table view. This table is in the measure evaluation report. Basically

the architect chooses the glass, the frame, et cetera. And the compliance author documents that. The end result out here at the building permit process is at the job site there would be a design label certificate that was used for compliance; it was used to show the compliance.

And that design label certificate would document for each product on the job site what the U factor is, the SHGC, and the VLT.

Okay, now let's move on to the field verification side of things, because as we all know, on most jobs you cannot write a closed specification. So if you want a -- for compliance purposes you can choose a particular ConAir frame or particular type of glass. But when you go out to bid you want to give the glazing contractor some flexibility to shop around and to find some similar product that has equal performance but may have a lower first cost.

So, there would be another label of certificate that would be generated during the bidding and construction process. And in the end the two would be compared through acceptance requirements, and that's how it would work.

So, the assumption that we're making

here in this process is that if you have -- if a glazing contractor proposes an alternate product that has a U factor less than what was -- less than or equal to what was used in design, an SHGC less than or equal to what was used in design, and a VLT that's greater than or equal to what was used in design, that it will, in fact, perform better.

Now, some of the experts in the field may be scratching their heads right now and thinking, well, is that true. For the most part, yes. Those 200-some-odd constructions that I showed you earlier, we did a test on those. And if you look at all the possible combinations there's something on the order of 45,000 combinations or possible substitutions.

We looked at all the cases where the VLT was higher, the SHGC and U factor were lower. And we looked to see if there were any cases where the TDV energy actually went up when that happened. And out of the 42,000-some-odd cases, there were approximately 60.

So, it can happen, but it's not likely to happen. In the cases where it did happen you were typically moving from a product that was less

expensive to one that was more expensive. So that was another -- and there's an appendix in the measure evaluation report that includes this analysis.

The point here is that I don't think -- my opinion is there's not a big -- we're not opening a lot of gamesmanship here by letting the U, SHGC and VLT be the test of equality. There may be a few unusual situations where it's not true, but even in those cases it's pretty close.

MR. SHIRAKH: You answered my question.

MR. ELEY: Did I answer your question?

MR. SHIRAKH: You were close --

MR. ELEY: They're close.

MR. SHIRAKH: Yeah.

MR. ELEY: And when there is a difference, Mazi, they're very close. The margin is very small. So I don't think there's a big issue.

But, anyway, the way this process would work is you would start with the SHGC, the U and the VLT that was specified in the design process. The glazing contractor would then put together bids, maybe that had other products that meet those specifications.

The architect may have other requirements, too, like the color of the glass or, you know, the reflectivity of the glass, other factors which would narrow it down even more.

The frame manufacturer would pass on to the glazing contractor the label certificate for the frame. The glass manufacturer would pass on the label certificate to the IG fabricator. And the spacer manufacturer would pass on the label certificate to the IG fabricator.

The IG fabricator would then pass on those, too. So the chain of custody for the individual label certificates would pass right along really with the bill of sales, or with the shipping invoices at the job site.

And then the glazing contractor would then -- and the combination that they accept you know would have a lower U, a lower SHGC and a higher VLT, otherwise it wouldn't be accepted.

And then at the job site the architect, the engineer, the glazing contractor, someone who's recognized by the California Practice Act, would visit the site and they would look at the label certificate that was there on the plans, which was used for design. And they would look at

the U, the SHGC, VLT on that. And then they would also pull out the label certificate that was produced through the construction process. They would compare the two, then show that the U and SHGC were lower, the VLT higher, and that would be the acceptance process.

So that's that change. And that's the end of my presentation. I probably left out a lot of details. There's a bunch of people here that know much more about this subject than me, one of whom is raising his hand right now, so.

MR. WONG: Guess I'll give my name this time. Joe Wong, LBNL.

This acceptance testing, I mean to me it seems kind of constrained because you're forcing people to go better on all three qualities. And I'm wondering what about actually doing a performance simulation and show that you have equivalent TDV since the model's already there.

MR. ELEY: Well, that's always an option. I mean you can, you know, if there's a major substitution during the construction process that's what you're supposed to do.

MR. WONG: Yeah.

MR. ELEY: I don't know how often it's

done, but --

MR. WONG: Because I just remember --

MR. ELEY: -- you're supposed to go back and do all the runs again and show that you still meet the standard.

MR. WONG: Well, you just have to do one run, right? Compared to --

MR. ELEY: Yeah, you'd have to do one more run, right.

MR. WONG: Yeah, because I just know when I go shop for windows there's infinite combinations. And, you know, one would be higher in U and slightly lower in SHGC. And it just seems like it's kind of constrained to say that everything has to be lower.

MR. SHIRAKH: Might be possible to have both options.

MR. WONG: Yeah.

MR. ELEY: Yeah, I think we could have both options. I'm not sure I'd want to limit it to the one you're suggesting because there'd be some, I think some enforcement issues here. We would be expecting the C-17 contractors to know how to run EQUEST or ENERGYPRO, and I think they're -- or someone on the job site would need

to do that. The glazing contractor maybe.

MR. PENNINGTON: I think the energy consultant would build in a little bit of slack --

MR. SHIRAKH: Right.

MR. WONG: Yeah.

MR. PENNINGTON: -- to avoid your problem that you're bringing up. And so, you know, they'd get --

MR. WONG: Well, --

MR. PENNINGTON: -- a little familiar with how close is too close to be spec'ing this.

MR. WONG: Yeah.

MR. PENNINGTON: And then back off a little bit and that would avoid the problem you're saying.

MR. WONG: Well, except under this method none of those conditions would qualify, you know. Let's say you have a window that has a slightly higher U and a slightly lower SHGC, it would not be accepted.

MR. ELEY: That's correct.

MR. PENNINGTON: So the energy consultant -- that would happen to him a couple of times, and they wouldn't spec it that tight the next time. They would --

MR. WONG: No, --

MR. NITTLER: They're supposed to (inaudible); they don't spec anything. You can't do a compliance --

MS. HEBERT: You've got to get to the mike, Ken.

MR. ELEY: There would be a spec; there's a label -- I don't know if I'm using the right terms here, but I'm saying that there's one label certificate that's generated during design and when you show compliance.

And then there's another label certificate that's generated during the construction process. And those two get compared in the field, part of acceptance requirements.

MR. NITTLER: I'm Ken Nittler with EnerComp. In another life I also operate a business called WestLab that does NFRC simulations and have been around the NFRC world for ten years in a whole bunch of different capacities, as board member, as technical committee chair and other things.

This proposal has some real interesting components that I think could be useful, but it has some things in it that also, I think, are

reasons to be very concerned.

And I'm going to split these things up into kind of modeling issues, NFRC issues, and try and take it along those lines.

First of all, let's talk about some of the NFRC issues. NFRC has been working, jeez, for five years or something, on what we're calling a component approach, that has many of the qualities of what Charles is describing here.

And on a technical basis I believe that system is very valid. And you can get basically the same -- or for all practical purposes, the same rating using our current test method where you look at a specific product or with a component approach. So I don't have any heartburn over the technical platform here. There's a lot of logistics, though.

I have, hopping around a little bit, on a DOEII issue, Charles, the graph that you have here, figure 1, do you know if the data in DOEII that you're talking about, is it the so-called default glazings? Are they directly from the Window program? And are they recent data?

I'm wondering if some of the difference you're showing here has to do with not less than

stellar defaults in DOEII, rather than unrealistic U and solar heat gain calculations.

MR. ELEY: Well, the data are not recent, that's for sure.

MR. NITTLER: Okay, well, then that instantly scares me because the spectral data stuff has changed over time. And I find it well, inconsistent at least that we're supposed to do this modeling in excruciating detail up front. But at the tail end we can throw it all away, and if the U value and solar heat gain is close enough then everything's hunky-dory.

It can't both be badly flawed up front if you don't do it in detail, but okay at the end of the process to change the U value and solar heat gain.

MR. ELEY: The VLT, also.

MR. NITTLER: And VLT. Okay. Anyway, there's something about that that doesn't add up to me.

I'll just point out one other kind of logistical thing here, is that, of course, real buildings have many windows, not just one window. So when you're talking about the label certificate, you're talking about potentially many

dozens of them per building. So it might be a little more than just kind of one of.

I want to start with one premise here on the site-built stuff, because I think there's a bit of what the terminology people call a red herring going on here. Let me be clear in my experience, this is my personal opinion.

For the most part, most industries' preferred solution would be that they never heard of a test lab, that they never heard of a test method, and that they don't have to get their products certified. If they had a choice, most folks, many of the companies in the fenestration world would prefer not to test their products at all. And they test for all kinds of reasons, air, water and structural reasons, way before they worry about energy.

So, the Commission could assist NFRC in building the world's most wonderful certification program, and there's still going to be a lot of people that aren't very happy. Because it costs them time and money. That is, that's going to be a cost in here.

So, I would urge caution in imagining that we could invent a system that -- I know that

a better system can be invented. I know that the current NFRC program could be improved. But creating one that still doesn't have a lot of people that say it doesn't work, or people that don't want to play is not a likely outcome.

One of the things that's proposed here is that -- NFRC historically has tested and labeled whole products; so this is a pretty big departure to test and label components. But one of the things that NFRC does on its certification program is at the end of the process there is some quality control that goes into whole products that are leaving factory floors.

Now, I wish it were more robust and I wish there was more inspections, but this process as described here doesn't talk about that aspect. And it leaves it up to sort of the design professionals signing the documents, saying that, yeah, we really installed all these things.

And my comment there is that's what the current standard does already. Design professionals sign off on all the documents. If this world is supposed to have NFRC ratings right now, and they don't, and all these design professionals are already signing the documents, I

just wonder again if we don't change how enforcement works, then I'm not sure that changing how NFRC works is going to solve the problem that we're working with here.

Maybe Joe could have some comment on this, but I can tell you that Window5 in my experience doesn't actually generate the DOEII file correctly. It only works on a single frame. So here you go modeling to incredible detail on multiple frame cross-sections because the vertical mullions are different than the horizontal mullions. And you do all this stuff, you get into Window, and it can't print a Window5 DOEII file. It can do it for ENERGYPLUS, but not DOEII. So that -- I see some frowning over there, but I can show you right here if you want to see that. Maybe a more recent version doesn't have that problem.

Another thing about the way NFRC works is it's a membership organization, okay. NFRC already has a lot of adversaries out there in the world. And one surefire way to increase that problem is for a process to be set up, or for NFRC to agree to a process that requires them to deliver a whole new system in a very short

timeframe. It's going to make it very difficult to take all these wonderful ideas, take them through committees so people are working on them; get the right program language drafted so that it could be approved within the way NFRC works.

And, you know, you say, well, sure, i can be done. But I would just pose this question: Would the Commission go out and ask ASHRAE to subvert its committee process to create a standard that you could adopt by 2008? Because that's what you're asking, is you would probably be asking for a very expedited process to be created that could make this all happen.

It could work, but it certainly organizationally is a challenge for a group like NFRC.

Now, here's one -- switching hats now and saying compliance jockey, which is a big chunk of my world, has nothing to do with NFRC -- I got to tell you I cringe at the idea that compliance software has to go out to somebody else's website to get data before you can do a compliance calc.

You could be doing work on BART; you could be at your cabin; you could be somewhere else. And all these things you don't -- you

cannot guarantee web connectivity before you can do a compliance calc.

So what that tells me is the system that gets developed here needs to have a robust set of, call them defaults. And so if you look at our current default table, what really should be in the standard is behind that default table each and every entry in that table should have this DOEII ENERGYPLUS file that's being described. and it should be identified as the default value.

And then for each prescriptive level that's in our standard we should have that default file in the compliance software, any approved compliance software should have to have those in its little database of numbers and so forth to calculate from.

And I really wonder if an extension of that idea, if you collected 10 or 20 categories of glass performance, of angular dependence of glass, that you couldn't, in fact, get a pretty good answer knowing the right NFRC frame values, knowing the right center of glass values and so forth, and what type of glass it is, if you couldn't, in fact, end up with a pretty good compliance calc.

And given again that at the very end of the process we allow people to throw it all out and adjust as long as they meet the VT, solar heat gain and U factor, maybe something like that could work.

My understanding right now is those default DOEII/ENERGYPLUS files aren't part of the ACM system on the nonres side. So there could be some ways to achieve much of what's being described here using an alternative like that.

I think I'd better stop there. Anyway, yeah, that's it. Thanks.

MR. BENYA: Jim Benya with the National Fenestration Rating Council. I think Charles did a good job here, but he's identified two different issues that may or may not have the same resolution.

The first is the maintenance of the window data files within the NFRC database. That challenge not only comes from the State of California but also from ASHRAE. We've been asked to do this. So I think this is something NFRC is going to have to do within its system somehow, is determine a way to maintain data files within the database. So that we have to do anyway.

The second issue is the component modeling program. And as Ken Nittler said, we have been working on that for quite awhile. And the board of directors has already responded to the state, and we will do whatever we have to to meet your needs to get a program that works for you. So just for affirmation on that case.

Thank you.

MR. PENNINGTON: I'm wondering, at some point, I'm not sure what's the right point, but I'm wondering if Joe Wong could respond to Ken's last comment about getting close with a library of -- a more extensive library than just a set of defaults. But, you know, is there a little bit more extensive library that could get reasonably close.

So, if I didn't state Ken's concept well enough I'll let Ken re-describe it. But, I'm wondering what you think about that, Joe.

MR. WONG: Yeah, I was just itching to respond to that. No.

(Laughter.)

MR. WONG: Well, first comment is what Ken asked about and Charles responded to, that's exactly correct. The default library that we've

been looking at is very very old. And many of those products were sort of hypothetical models, you know. So that definitely needs to be updated to fit, you know, what's actually out there. And I've been kind of pushing that for a number of years. And people at LBNL do have it in the works to do that.

Then the other question is whether we could have default Window4 files. I think that's very do-able. And my own hunch is that if we start doing that we'll find out fairly quickly that we could get pretty close to the answer with, you know, a dozen or so of these Window4 files.

But, you know, without actually doing it I can't really say. But right now there are no default Window4 files, except that old library. And I know, I've looked at that old library, and, you know, it's very frustrating because it would just have ranges of emissivities and ranges of air gaps and that's it. And those were all developed a long time ago.

MR. HAIAD: What was the other question? Oh, you said something about the Window4 files that go into DOEII and ENERGYPLUS. And, yeah, there is a difference there that in DOEII you're

really taking Window4 or Window5 results, and then modeling that as effectively a single pane with those properties.

In ENERGYPLUS it's more detailed. ENERGYPLUS actually does a layer-by-layer calculation. So you would think that ENERGYPLUS would get a better, a more accurate result.

MR. ELEY: I wanted to address a couple of things. We used the data, the default numbers in DOEII just because it was easy to do, wanted to see what the difference was.

I believe, though, that Jeff Hirsch has done a comparison with other data, other than the defaults, and Jeff's not here now, but, Jon, you may know. I know you brought this up a few times. You may want to address this, or Carlos.

So, I think there are some other data. They're not in our report, that compare -- and, quite frankly, I don't know if the problem gets worse or better when you look at the more recent data. It could get -- my graph could get worse, I'm not quite sure which way it would go.

The other thing is that -- and I realized after you spoke that I didn't make this clear in the presentation, but our plan is to not

close the door to the existing way that things are done. At least not immediately. We don't want to close the door until we know that the NFRC library is working.

So, you'd be able to, I guess, choose the, at least maybe for some period of time, choose the detailed method or the U factor method. So you could go either way.

And the same is really true for the site-built. I mean we would not abandon the default tables. You could continue to use those. Obviously there'd be a pretty strong incentive not to use them.

So the plan is not to close the door to the existing procedures, but to offer a more accurate option.

MS. HEBERT: Okay, Carlos, and then Marshall.

MR. HAIAD: Carlos Haiad, Southern California Edison. We are, right now, engaging in a process of updating the DOEII library for Windows. We have started up work already. And the goal is to run Windows5, and then translate all that into DOEII inputs.

And the DOEII inputs from the user's

perspective would still be the usual that is mandated by code, but behind that is the entire library.

And there is a commitment of Edison at this point to keep that library updated; not on a monthly, but maybe every 18 months or so we would revisit and see if some new products have come to the market that are not in the library. And then put in the DOEII library and make that available.

MR. ELEY: But these would still be generic products, though; they wouldn't be directly linked to a CPD number and --

MR. HAIAD: It would, it would be direct linked.

MR. ELEY: It would be directly related?

MR. HAIAD: That's correct. That's correct.

MR. PENNINGTON: So how many products are you talking about?

MR. HAIAD: A few hundred for sure. But I don't, you know, whatever is needed to build the library to something that is reasonable. It may not be all of them, true.

MR. ELEY: Well, the NFRC, you have 100,000 --

MR. HAIAD: Yeah.

MR. ELEY: -- products in the database, so --

MR. HAIAD: Now, I -- yeah, I agree with --

MR. ELEY: A hundred is a good start, but --

MR. HAIAD: Well, you know, got to start somewhere.

(Laughter.)

MR. HAIAD: And we would still have the generic, for sure. You know, we won't change what is already DOEII. We'll update what is in there.

MR. WONG: How are they --

MR. PENNINGTON: We're going to have to have you come up, Joe. You can sit down here. Just join the conversation here.

MR. HAIAD: One quick comment, though. I agree that requiring somebody to be online to do the analysis, maybe okay that you are online to bring down the data. I'm very comfortable with that. But not necessarily to perform the analysis.

So, if you want the data you got to be online and grab it. But the guy should be able to

do, you know, the work regardless if he's connected while performing the task.

MR. WONG: My question was just on your DOEII library, or the Window4 library. How are the --

MR. HAIAD: Five.

MR. WONG: File, yeah. How are the different Window products identified? I mean with a U value, SHGC? Because you probably don't put the CPD number --

MR. HAIAD: Yes, we go back to his library. And we pull a real glass and perform the analysis on that piece of glass. We go to a catalogue of the manufacturer and find the particular piece of glass and perform analysis on that glass. If the manufacturer can provide that data to us, we would use it. But that's not always, you know, --

MR. WONG: Well, you know, the default library has this four-number code.

MR. HAIAD: Yes.

MR. WONG: Is that -- are you using something like that? Or are you actually giving product names and say, --

MR. HAIAD: No. Yeah, yeah, I

understand. No, you're saying the user, how he goes about --

MR. WONG: Yeah, how does he --

MR. HAIAD: How he interacts with that.

MR. WONG: Yeah, how does he get the one that he's looking for?

MR. HAIAD: It's -- both will be there. We are, in fact, planning to have the generic, if you will, which is just, you know, zero, zero, whatever.

MR. WONG: Yeah.

MR. HAIAD: And the vision is as this progresses we will actually allow you to pick a manufacturer with a product in there.

MR. WONG: Well, that's almost identical to the CPD, what NFRC's doing, right?

MR. HAIAD: That's fine.

MR. WONG: Yeah, yeah.

MR. HAIAD: The reason is this actually has an impact on my programs. Okay. I pay a fair amount of money for the person to put high performance glazing. And I know it's based on that simulation. And I'm not getting the bang for the buck. I'm just not.

And you notice that at the building

level might be 2 or 3 percent; but at the load level, it's, you know, 500 percent off in some cases.

This is a long-term thing. It's not, you know, it's not going to be done overnight or any of this. So the generic library is short-term, because it's just a very finite number of what is in there.

MR. McHUGH: Jon McHugh, HMG. I think the difference between what Carlos is doing is that in DOEII.2 or EQUEST, they've actually got the Windows model inside of EQUEST, and so what you're downloading is the spectral data file for the glass.

And you're not importing the DOEII output file from Window like Charles is talking about, I believe.

So, my understanding of what you're doing is essentially -- an implementation of Window in there you have to import some description of the frame. And then, you know, it's doing all those angular calculations of glass within DOEII.2.

MR. HAIAD: That's correct.

MR. McHUGH: So, it's --

MR. HAIAD: I'm not importing a finished product, so to speak. It's just the properties of the glass.

MR. WONG: Oh, okay. Okay. Well, I think -- I hope I don't have to mention my name each time -- well, I thought one of the concerns of the Commission is -- and the reason you've been working with NFRC is sort of the certification aspect of it. Because, you know, I was told that you could. I mean anybody right now could use Window5 and get their own Window4 file. But it's not certified and can't be used in Title 24.

So, you know, I'm not casting aspersion on it, you know, what SCE's doing, but there would be that problem there. Will the Commission accept those values as certified.

MR. HAIAD: I don't know what is the process, if there is even a process, to certify those files. But that is important enough for my programs.

MR. WONG: Yeah.

MR. HAIAD: My incentive programs that I'm doing, regardless.

MR. McHUGH: I've got a question here for NFRC. How many of these DOEII export files

are currently available?

MR. BENYA: Zero. Like I say, we don't maintain them. NFRC currently does not maintain those files. We'll have to change the way we do business to maintain the data files, the Window data files.

MR. ELEY: But they are generated every time a new product goes into your CPD --

MR. BENYA: The simulators --

MR. ELEY: -- the data is generated. But it's just not kept.

MR. BENYA: The simulators have it, but they don't bring it up for our database.

MR. McHUGH: And related to that how many therm files are available so that for instance instead of necessarily having all these DOEII files, you already have the spectral data files for all the glass. What about the frame files or therm files for the frames, so that to regenerate those DOEII files, how readily available is that possibility?

MR. McHUGH: I'd rather -- Ken, do you want to address that, the simulator?

MR. NITTLER: Thinking this through what you'd have to do to implement this would be -- or

my recommendation would be you take the smarts of Window5 that takes the glass library you're talking about; then you move the smarts of Window5 to the NFRC website. So it picks the glass layers out. And then it can do the calculations to generate this DOEII file. And with that it reads the information from the therm file that has the frame in it.

And so you're going to be pulling it from multiple places. But you'd move -- instead of the smarts being somebody executing it on their desktop, you move the smarts of the Window engine to the NFRC website.

That would maintain, I think, one of the points Charles was heading at. Unless you want to end up with everybody having to maintain these giant databases all the time, you need to keep the parts separate. And that's what would let you keep the parts separate.

As far as passing individual therm files, it's not very practical. I mean they're large, or can be very large. And at least the way the rules that NFRC plays by, you could have hundreds of them for each product line. It would be very cumbersome.

MR. McHUGH: Why I ask is because, you know, EQUEST has gone down this path of implementing Window5 within EQUEST. The glass, you know, the glass database is not as huge as that 100,000 different window types; it's a more manageable size. And some of the issues have to do with the permutations of glass and frames and things like that. I'm just trying to investigate whether or not it makes sense to have, in addition to a glass library, a frame library of the frames that are used with Windows, and kind of --

MR. NITTLER: But that is what the proposal is. Maybe it's not the therm file you're talking about, but it would be an individual frame library that would have enough detail to calculate the thermal characteristics of the frame material. So I think that's what's being proposed here.

MR. McHUGH: And why would that necessarily need to be on the website? It would be something that you could then pull down into your simulation program, along with the Window --

MR. NITTLER: Well, understand, most of these site-built products are custom. They're different every single time. So, the idea that you create a standard library that's used, some of

the products would be used over and over again, but a lot of them are custom.

MR. McHUGH: Right, but the first part of this whole discussion that Charles was talking about earlier was the information from the manufacturers for premanufactured products that either were looking at having a frame and glazing file; or that there's this DOEII file that, you know, either, you know, -- you could do it either way.

MR. ELEY: No. I think with the premanufactured window there would be a specific detailed file for each CPD number. So there's not the software in that case that combined things. You put in the CPD number and it goes and gets the file and uses it for simulation.

While I'm speaking, one of the reasons that we're recommending that the software be online -- and I understand why you might cringe, I'd like to do work on the train, as well -- is it has to do with -- it would be if you were able to download the file separately and then do the simulation later, it might be possible for someone to go in and edit that file and to make changes.

So, I think if we could figure out a way

to provide that security and confidence during the compliance process we might be able to eliminate the requirement that the software be online. But that was the reason that it was there.

MR. NITTLER: Oh, encryption. But I think you were asking a different question. Why a different system for a manufactured window versus a site-built? Were you trying to head there?

I mean ultimately I think the way I would view the way things would play out in the NFRC world is eventually this same approach on keeping the glass separate from the frames would occur for all product types. It'll take awhile to get there, but I'm sure that's what will happen. Reasonably sure that's what would happen.

MR. WONG: Well, I thought your point was instead of keeping the 100,000 W4 files that would collapse a lot if you kept, you know, a frame library and a glass library. And then have the web interface do that in calculation.

MR. ELEY: Well, as far as the compliance process is concerned, it's a black box.

MR. WONG: Yeah, oh, sure.

MR. ELEY: You're going to hand it a CPD number --

MR. WONG: Right, right.
MR. ELEY: -- and you're going to get back --
MR. WONG: Yeah.
MR. ELEY: -- a data file. However NFRC produces that data file --
MR. WONG: Um-hum.
MR. ELEY: -- as long as the Energy Commission approves that process.
MR. WONG: Yeah. Because ENERGYPLUS is in the --
MR. ELEY: So that it's a black box as far --
MR. WONG: Yeah.
MR. ELEY: -- as the compliance software is concerned.
MR. WONG: Yeah. I mean ENERGYPLUS is similar to EQUEST in the sense that we've also imported the whole glass library. So we could do all that Window4 file calculations. We just don't have the inputs, you know, like for the frame characteristics.
And I guess your point was that if you could be broken up that way, then perhaps you don't need to have it online. I mean, I agree if

you have 100,000 files, you know, it's probably best to have it online, plus this cheating problem. But if it's like a couple thousand glass types, that's a very manageable size.

But frames, I don't know, I don't know much about frames. But they must be huge.

MR. McHUGH: The other question I have related to all this is that, Charles, you brought up the issue of the idea that someone has a sort of standard glass that they're willing to live with. And they're saying, okay, I'm going to have a -- I'm going to allow my glass contractor to go out to bid and have a little bit of flexibility.

In terms of, you know, that there's a T-viz component, what flexibility or what options do we have when we are looking at (inaudible) glass, or glass that is diffusing. My understanding is that at least for diffusing glass there's no NFRC-recognized simulation process. And in fact, that the glass library, that there's no spectral database for glasses that are diffusing currently.

MR. BENYA: Jim Benya, NFRC. Actually I was visiting with LBNL a couple weeks ago; and they're actually developing processes to do that. And we're hoping to be able to add those to the

special data library in the future at some point.

MR. McHUGH: And would this be by 2008?

MR. BENYA: Yes, I would hope.

MS. HEBERT: Marshall.

MR. HUNT: I think John's first. Because I'm on a totally different --

MS. HEBERT: Oh, okay.

MR. HOGAN: -- do this segue for Marshall's discussion. John Hogan, City of Seattle.

There's been a lot of discussion about potential modifications in the NFRC process, all these technical directions. I don't know that you're really going to get many other people to be using the NFRC process with what's happening in California right now.

Seems there's three possible reasons why people are not using the process. One is the defaults are too lenient, so there's no incentive. Why do it when you can do better on the defaults.

The second is that the tradeoff procedure is too lenient, or the standards are too lenient, so why bother dealing with this NFRC if I can just plug in whatever I'm going to do with my other components in the building, and I comply, so

I don't need to do it and use the defaults. Even though they don't comply prescriptively, they would still comply.

And the third is the building is not complying and you're not getting good enforcement.

In terms of the first one where the defaults are too lenient, I'm looking at table 116A, which is the default table for U factors. And double-glazed windows are .71 U factor, .79 if it's operable. For seven out of the 15 California climate zones you need a .77 U factor.

So for half of the climate zones in California for U factor the defaults are there. There's no reason to ever look at an NFRC rating.

The way the NFRC requirements are applied here it's buildings which have more than 10,000 square feet of glass. So, we're talking a larger building. So if we think curtain wall, I'm looking at some of the defaults here. And even for climates -- if you do a metal frame product with a thermal break, the default is .55, but you get another .05 if you have a half-inch air space, which is typical for all nonresidential products. You get another .05 if you have low E, which seems is very common.

So you're down to .45. So even the .47 U factor, which is required in the worst climates, the other eight climates, if you have the curtain wall with the thermal break frame, again you're there by default. So there's no incentive or reason to even go to NFRC.

I would also point out looking at those default values with the different subtractors and comparing them with the ASHRAE handbook of fundamentals, these are more lenient than the ASHRAE handbook of fundamentals.

So I thought I'd heard some discussion that people thought oh, it's getting tougher because the, you know, credits and the default tables are more limited. The options may be more limited, but the numbers you can get are more favorable. And that's the U factor side.

On the SHGC side that's not the case. So really the only reason to go to NFRC it seems --

MR. ELEY: But that's all that matters in California.

MR. HOGAN: Well, so, --

(Laughter.)

MR. HOGAN: -- is SHGC, and so

essentially you can't comply prescriptively with the SHGC requirements. Can you comply easily enough with the tradeoff methodology. You know, I don't know how close. That's for somebody else here who's done more tradeoff calculations than me to know about.

Being here at yesterday's discussion where there were just more and more proposals to give us credits for underfloor systems, give us more lighting control credits, give us more credits for natural ventilation, if all these credits are built into the system it's not surprising that people can just do the modeling and then they don't really need to comply prescriptively, you know, they can do the tradeoff.

The third one is the enforcement issue. And I think if people aren't complying it's because of SHGC, you know, maybe people are just showing the SHGC specs for the glass and saying, isn't that good enough, you know, can I comply. And maybe they're not so far off by doing that, but sure, there should be better compliance.

NFRC is a requirement for projects in the Washington State Energy Code. We have

defaults. Our defaults are not as lenient as the ones in California. They're more stringent.

We have tighter U factor requirements. We do see more people using the NFRC procedure.

For buildings with up to 30 percent of the wall in window, we require .55 U factor. And people can get to that with double-glazing, thermal-break frame, low E, different things. If the glaze carries more than that, you need a .45 U factor which is slightly more stringent than your value here. You can't get there with our defaults unless you're doing argon and doing some other different types of things. And also using very good low Es, not any low E the way the California default is set up.

So, we see some people trying to work with the defaults, but we also see people using NFRC procedure because there's some benefit to do that.

And in Seattle, where I work, in our enforcement we very carefully review all the computer modeling. So, to respond to Ken's point earlier about architects and engineers already stamping the drawings just because you're going to say they still have to stamp the drawings, I don't

think that gets you any closer.

We had a process when we first adopted our energy code in 1980 where for six months we were hiring staff and we accepted architects' or engineers' stamps for that time period. Inevitably after that there would be project revisions. They'd need to come back. We'd review the plans, and we found out they didn't comply.

And so we, since 1980, we've never accepted architects or engineers stamps for compliance with energy code. And we check that and we check all the computer modeling. And our experience is that not that many people do computer modeling. They know we're going to look at it carefully, and it's, I think if you want predictability you work through a simpler method.

If you're going through computer modelings and you've got a lot of extra savings then it can be worth your while. But if you're doing it to cut it real tight, you're going to be down to the wire making some decisions. And so I think it's less of an interest to architects and engineers to do that.

So, overall the thoughts, it seems you should look at compliance, sort of what's

happening. Whether there is good evaluation. And I would also look at the defaults there, and see whether you want to limit this just to buildings with more than 10,000 square feet of glass. If you really want NFRC you should make it more a regular thing, not just something for very large projects.

And then don't make the defaults too easy if you want NFRC. If you're happy with the defaults, you know, you've got a type of glass and frame you want, sure, spec the defaults and just have everybody do that.

MR. ELEY: John, just for clarification, are you suggesting that we stay with the current NFRC label certificate method, but just make it -- provide more incentives for juice?

MR. HOGAN: I don't think the CEC needs to get involved in that. I think the CEC has referenced the NFRC procedures for 12 years, I forget how long the time period's been, and what NFRC has developed, that's what the CEC has used.

And so I think rely on NFRC to bring forward a process. And, you know, if people from the CEC want to participate in that and there happen to be members from the staff here on the

board of NFRC, I know there is some involvement in the NFRC process.

But I don't think that NFRC process needs to be decided through this Title 24 revision.

MR. HUNT: Good afternoon; my name's Marshall Hunt with PG&E, and focusing on compliance. That's why I asked this chart to be left up here.

And I'm very pleased that people are worrying about what I consider to be the phase before this where we're going to model what's happening.

But you have to remember out in the field, and I also was part of that teaching team with Bill Mattinson under the direction of Dr. O'Bannon up at Chico State, and what we found is that we have a pretty good chance of having that middle group of modelers and technicians do their job right. And it's going to get better as we work on it.

But the architects up front are still stuck in that world, well, I want green glass, oh, dual pane, and that's all they know. And then on the other end, the C-17s are stuck in this world

where they don't know what's going on. They aren't producing any of the present documentation that's required. And they also don't want to accept any responsibility. Now, that may be too bad, since they are contractors and they have to accept responsibility.

But one of the big buckets of cold water that dropped on us about halfway through this process was that one of the major frame manufacturers who was supposed to be coming online with an NFRC certification process that would zap right out, their legal department said no. This is what we understand in the field. It may be rumor, but what all the glass people and the contractors out in the field thought is that this major frame manufacturer had everything all set up. And then at the last minute their legal department said no, we will not accept responsibility of the liability issue because we don't make the spaces, we don't make the glass, we don't make the IG unit, all we do is make the frame.

And so then we have to look for who's going to really be responsible for these things. And this component approach seems to be the most

logical.

So that's sort of where, John, if we talk about NFRC that's the feedback we get from the field of real world, to say we need this component.

And then I'd like to leave open for future discussion, probably at that meeting about compliance that CABEC mentioned, that we look further about how to tweak steps 4 and 5, both now, it's a different process, but also in the future so we get better compliance in the field. Because it's just not there.

I challenge anyone to go on our site today and try to find certification forms FC-1, FC-2 or a site-built certification. You just won't find it. And none of the people I've talked to even had done one.

So, it's pretty amazing, just the lack of knowledge. And as someone said, it's been in force since 2001. So it's a real issue out there. I think there's lots to gain from --

MR. ELEY: It's been on the books --

MR. HUNT: Yeah, it's been on the books. So I think we'll see a lot of improvement by this focus that we've started with this component

procedure.

Thank you.

MR. WONG: Could I ask a question of John, because I'm very confused. I mean, are you not in favor of going to the more detailed modeling method?

MR. HOGAN: I think there's two issues. There's the technical accuracy, and there's the certification. And I think as Ken indicated the numbers coming out of the process look like they're going to be pretty similar.

If they were going to be pretty different you would have heard a lot about that, I think. But I think the manufacturers feel that the U factors and SHGC and VT numbers are going to be fairly similar using this process.

Now, that's different than this notion of modeling something in DOEII where you're taking the actual spectral data file as opposed to the perpendicular SHGC value, those sort of things.

The issue of site-built has always been certification. It hasn't been the technical issues. None of the frame manufacturers, glass manufacturers, spacer manufacturers, I don't think you hear any of them talk about technical issues.

It's all certification.

And I'm not sure how this process works. I'm not sure how you have a frame manufacturer, a spacer manufacturer and a glass manufacturer taking responsibility.

And it's not, of course, those simple components. We see argon in products, too. So we've got something that's fitting in between the glass there where the space is, is holding the glass layers apart. And are those separate things?

And certainly building plans examiners, building inspectors aren't going to know the variations of all the various -- you know, people work on spacers do all this fine precision stuff to just move things around to take out the high conductivity pass. None of that can be seen visually; none of that can be inspected visually.

So I think getting down to this component thing, it's more problematic.

That isn't to say it couldn't be done. And if NFRC goes down this path, I hope that all gets sorted out. But I think that's one of the challenges that's still outstanding.

MR. SHIRAKH: The point of this

methodology that Charles described, you don't have to do a visual inspection. All you care about in the end is the U value, SHGC and the VT.

MR. ELEY: And what the label certificate --

MR. SHIRAKH: And what the label certificate would say. So there's really no need to do a visual inspection or sniff out argon or anything like that.

MR. HOGAN: John Hogan. So now I'm going to ask you how this process works. So you got a piece of paper that says these components are in there. Who is saying those components are in there?

I mean you can get a piece of paper all the time. If the building department wants a piece of paper, we got lots of people willing to give us a piece of paper.

MR. ELEY: Well, I mean --

MR. HOGAN: That's not a problem.

MR. ELEY: -- you could ask the same question about the current label certificate process. I mean basically what we're suggesting is that when the spacer manufacturer ships product to the fabricator, that they include the label

certificate for the product they ship.

When the frame manufacturer ships product to the glazing contractor they include the label certificate, the component label certificate for the product they ship.

And the glazing contractor would accept the component label certificates for the glass, the spacer and the frame. And those would become the label certificate for the assembly.

So, I mean, I guess -- I mean there's opportunity for fraud, you know, all along the way. There always will be. But, I don't think it's any worse here than it is with the current procedure.

MR. HOGAN: I think there's a difference, though. Because now NFRC has a process where the people who were getting the label certificates, that they get audited and they have to have the paperwork in their file to verify that these are -- so, it's the glazing contractors, primarily, that they must have all this information that this is all correct.

I haven't seen -- the NFRC process --

MR. ELEY: We didn't get into that detail here --

MR. HOGAN: -- hasn't come to the conclusion yet. So I don't know what's going to happen there.

MR. ELEY: I don't know. We talked about maybe the IAs being a part of the component label certificate process here, as well. So you could essentially apply the exact same process, but at a component level.

MR. HOGAN: It seems one other potential downside to this working with components is that specifiers could go more to the component level and codes could go more to the component level. You know, if we're not dealing with overall U factors, you know, we can just say in the code it's got to be double with low E with emissivity less than this. It's got to be this type of space, or it's got to be a thermal break frame.

I think that's not where we want codes to go. We'd rather have people deal with the fenestration product and leave it up to the manufacturers whether that's one manufacturer or multiple manufacturers, to figure out what the package is which brings that together.

And, so concern about it being individual is that things might really get more

individual. And I don't think that's a good path to go down.

MR. SHIRAKH: Well, we are still dealing with system U values and SHGC and VTs. So in the components go in there and they give you the number that includes the system numbers that can be used.

And also, I mean, you know, you mentioned that our U factors are too generous. But the climate zones that you mentioned are generally not the more extreme climate zones.

In the cooling climate zones it's going to be very difficult to meet the levels using the defaults. Yet we still don't see anybody using the NFRC process in this state. And I don't hear any alternative suggestions from you as, you know, if the current system is not working, what Charles is proposing is not working, then what would the solution be?

MR. HOGAN: I'm not saying the current NFRC system is not working. What I'm saying is either people are complying other ways, that the trade-off methodology has lots of bells and whistles that people take credit for. Or else the enforcement isn't as good.

And so I don't know which of those are the reasons.

MR. SHIRAKH: I suspect it's a combination of the two. Because the current system is not working, perhaps the enforcers are not enforcing because they know it'll be a problem if they try to enforce.

MR. HOGAN: I don't want to belabor this too much, but it seems every time there's a new requirement in the code, you got to get people onboard. You know, you got to do enforcement. We tell our staff, we get a new code every three years; the first six months are crucial.

You know, everybody's got their stuff on their specs, on their computer, you got to send out a lot of correction lists in the first six months, you know. And got to get everybody switched over to the new code. Once they get switched over, it's easier.

And if you've had a system where it was manufactured products that used NFRC and the others used a big default table, and they were used to that, and were able to coast on that. And you switch over to requiring NFRC, you know, if they really have to do it, you know, if they can't

do the tradeoffs or something else, people need to write those correction lists. They need to start making it happen.

MR. SHIRAKH: Jon.

MR. McHUGH: Jon McHugh. Charles, maybe you could answer this question for me. Do we know that we actually have a problem? Just because there's only 12 site-built certificates applied for, if people are using thermally broken frames and double low E glazing, do we actually have an energy problem? Or just because people aren't going down the NFRC path, is that necessarily a bad thing?

MR. ELEY: I don't think we know. We don't know.

MR. McHUGH: So, I mean, I see lots of benefits to improving the accuracy of the calculation, but I kind of wonder if, you know, trying to specifically push people into NFRC certification of site-built fenestration is one, that there's a problem that we're actually correcting. It might be that, just as was mentioned earlier, there's costs associated with doing this. And is the state actually getting something back to imposing those costs on the

builder?

And it seems to me that if there's a case proposal around that, it would need to be some kind of proof, or at least some description of the cost effectiveness of actually trying to, you know, force something past the cost effectiveness of what the current practice already is.

MS. HEBERT: That's a great point, Jon. Maybe we need more information on what's actually out there. Does anybody else have any more comments on this topic?

And, unfortunately, Bill Pennington's out of the room, so I think we'll proceed and go to the next part of our agenda, which is to open the floor to anyone else that wants to make suggestions to us for the 2008 standards.

So, may I have a show of hands of those who would like to speak?

(Pause.)

MS. HEBERT: All righty, then. Reed Hitchcock, the microphone is yours.

MR. HITCHCOCK: Was I it?

MS. HEBERT: For the moment.

MR. HITCHCOCK: I don't have much. Reed

Hitchcock representing the Asphalt Roofing Manufacturers Association.

Again, I wanted to thank the CEC Staff and especially Elaine Hebert for -- Hebert -- for welcoming us and giving us the opportunity to speak.

A couple of questions, a couple of comments not related to anything but roofing, unfortunately.

The first one, a question for you all. Wondering if you can say, at this point, if under consideration would be prescriptive requirements for residential roofs that include both new construction and reroofing.

MS. HEBERT: Is Hashem Akbari still in the room? He's doing some work on behalf of the utilities on that. And, yes, I believe we are.

MR. HITCHCOCK: On both sides?

MS. HEBERT: On both, I believe we are.

DR. AKBARI: I'm physically here, but not mentally.

(Laughter.)

MS. HEBERT: Did you hear the question?

DR. AKBARI: Yes, I did. Thank you, Elaine. Hashem Akbari, Lawrence Berkeley National

Lab. The scope of the work is to complete all roofing criteria for the residential and nonresidential buildings, both slope and non-slope.

And typically the analysis is being done for the new buildings based on prototypical simulations. And once the analysis has been completed for that, those results are being considered whether it can be applied for reroofing application.

MR. HITCHCOCK: Okay. Any idea when there would be more information on where that falls out on reroofing?

DR. AKBARI: We are hoping to present the results of our analysis for the next Commission workshop. And the plan is there to have some kind of draft report out for review about three weeks before that.

MR. HITCHCOCK: Okay. A follow-up that may be relevant to that. You may have already answered it, but the follow-up question would be as part of that would the Energy Commission be looking also at alternative prescriptive requirement compliance options as exists now on the 2005, such as the insulation tradeoff for cool

roofs, or --

MS. HEBERT: That's kind of implicit in the prescriptive.

MR. HITCHCOCK: Okay. The comment that I wanted to make was just following up the October workshop, or actually following the October workshop, ARMA had gone on the record indicating that certainly we understood there was a lot of data that had to be compiled.

I know that we're offered to give you data. I know that you've asked me when I'm going to do that. And I guess part of the question would be what data can we provide. And we can discuss that offline.

But we'd also followed up with a letter on January 19th where we kind of reiterated the need for sufficient time for industry, ARMA and other stakeholders on this to gather our data and respond to any proposed regulations. And looking at probably a minimum of about 90 days on that.

And just wanted to reiterate that we feel very strongly that we need that time. That was all. Thank you very much.

MS. HEBERT: Thanks, Reed. Any other comments, suggestions, discussion?

I am seeing no one coming forward. So, I think we're going to call this meeting to a close. And I thank everybody for your participation.

The transcript from these two days worth of meeting workshop will be posted to our website shortly after we receive it from the transcribing company; that's sometimes two, three weeks, maybe a little bit more, maybe a little bit less.

(Whereupon, at 3:15 p.m., the workshop was adjourned.)

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CERTIFICATE OF REPORTER

I, CHRISTOPHER LOVERRO, an Electronic Reporter, do hereby certify that I am a disinterested person herein; that I recorded the foregoing California Energy Commission Workshop; that it was thereafter transcribed into typewriting.

I further certify that I am not of counsel or attorney for any of the parties to said workshop, nor in any way interested in outcome of said workshop.

IN WITNESS WHEREOF, I have hereunto set my hand this 14th day of March, 2006.